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EDITORIAL.

THE LETTER ON mine ventilation, by Mr. John A. Church, which appears in our Discussion Department, will prove suggestive to those who are engaged in driving long adits, such as are common throughout our mountainous mining regions. Inefficient systems of ventilation, or the more frequent entire lack of system, is an important factor in augmenting mining costs by impairing the power of the human machinery employed underground. A regard for the well-being of the employed may begin or it may end in proper consideration for their health, but whether such a sentiment comes first or last, it is quite certain that the miner as an economic unit is rendered of maximum value when he is enabled to work under healthy conditions. We commend Mr. Church's remarks to mine managers.

WE PUBLISH ELSEWHERE a letter from Mr. Andrew Carnegie in regard to the James Watt Memorial which is to be erected at Greenock in Scotland. A strong committee, with Mr. Carnegie as chairman and Mr. Theodore Dwight as secretary, has been formed. We commend the matter to the favorable consideration of our readers.

SEVERAL ESTIMATES of gold production in 1903 have been published since our number for January 7 was issued, the more important of which we find in the *Commercial & Financial Chronicle,* of New York, and the *Statist,* of London. It is rather unfortunate that there should be a considerable error in these estimates of our contemporaries, which we find principally in the reports from Australia and some other British colonies. A good deal of this arises from the bad practice adopted—especially in Australia—of making reports not in fine gold, but in bullion, which varies widely in fineness. This is misleading in many cases, and is very apt to result in overestimates. The only rational or safe practice is that which has been in use for a long time in this country, and which has been adopted in the Transvaal since the war; that is, to report the quantity of fine gold produced, which is, after all, the only standard. We hope that this

practice will be extended, and especially that the other Australian States will adopt the method of the Queensland Mines Department and report fine gold as well as bullion.

THE REPORT OF British mine production, given on another page, shows that the total output of coal in the United Kingdom in 1903 was 230,323,391 tons, showing, as compared with the previous year, the moderate increase of 3,238,520 tons, or 1.4 per cent. The measure in Great Britain is the long ton of 2,240 pounds. Reducing these figures, for purposes of comparison, to short tons of 2,000 pounds, we find that the total in 1903 was 98,834,493 tons less than the output of the United States, as estimated in our issue of January 7. That estimate was rather a conservative one, and the lead shown by our own country over Great Britain will probably prove to be over 100,000,000 tons, when the full figures for this country are ascertained.

Great Britain, however, is far ahead of us as a coal exporting country. The total exports, including coke and briquettes, last year amounted to 46,622,700 tons; and, in addition to this, there were 16,799,848 tons sent abroad for the use of steamships in foreign trade, so that a total of 63,422,548 tons, or 27.5 per cent, of the entire output, were consumed outside of the United Kingdom.

THE REPORT OF THE Osceola Consolidated Mining Company for 1903, an abstract of which is given elsewhere, shows that the company maintains the policy adopted in consequence of the protest made three years ago by the stockholders, and gives them excellent reports. The present statement affords complete figures of production, earnings and the like, and also of the operation of the mines, so that stockholders have no reason to complain of the information which their directors have furnished them. It also appears from the report that through its new stamp-mill and other improvements in methods the Osceola has achieved notable economy. Its cost of producing copper fell from 11.77 cents per pound in 1902 to 10.29 cents last year, a marked saving. A little of this may have been due to a slight increase in the amount of copper obtained, but this was only 17.4 pounds per ton of rock stamped, the gain over 1902 being 1.4 pounds per ton. The average price obtained for copper was 13 cents, or, if interest and miscellaneous receipts are included, 13.11 cents, so that a net profit of 2.82 cents per pound was shown, enabling the company to clear off a considerable debit balance and to resume the payment of dividends. The report must be considered as being, upon the whole, fairly encouraging, especially as it shows good results from some of the company's new exploration work.

THE ENGINEERING BUILDING.

As was foreshadowed in these columns last week, Mr. Carnegie has seen fit to carry through his purpose despite the refusal of the civil engineers to take part in the plan, which was to centralize the leading technical societies in a building to be erected mainly through his munificence. We publish the letter given out by the conference committee. It speaks for itself. Mr. Carnegie's bestowal of a million and a half is made in a terse note which is expressive enough, and will be deeply appreciated not only by the three societies and the club so generously financed by him, but also by the rank and file of those active workers to whom the central building in New York city will be a rallying point, an island of safety, a professional headquarters.

To the Engineers' Club, already representative in its membership of 1,200, the carrying out of this broad-gauge idea will mean a great deal, for the new club-house will be alongside the engineering building, although a separate "administrative entity," as Mr. Hay would say; nor does the usefulness of the proposal end here, for it is now understood that not only the three national societies which are the chief beneficiaries, but other kindred technical organizations will be enabled to secure quarters in the building, so that engineering in all its branches will be benefited. Taking it for all in all, it is a splendid consummation of the efforts of a group of public-spirited men, and we doubt not that this great trust for the engineering professions in America will prove a notable force in the development of industrial art on this continent.

MINING IN CHINA.

On another page we publish a letter from an engineer at Tong Shan, which gives some plain truths concerning conditions affecting mining operations in China. In our last issue Mr. Wallace Broad, advisory engineer to the Chinese government, contributed an interesting letter on mining—not in China, but in Rhodesia. Thus does human interest link spaces far apart.

It is a mistake to assume that the mineral resources of China are but little known; the recent opening of the Empire by diplomatic means indicates the pressure of heavy financial interest at the back of the diplomatic machinery; and the existence of financial activity in such matters argues the possession of information of a detailed kind. As a matter of fact, there are to-day at least twenty-five companies or syndicates represented in China by competent technical men, who have been placed there in consequence of years of investigation —the results of which have warranted financial houses, American and European, in keeping a look-out for an opportunity to secure concessions or control existing enterprises.

The only resources of proved value are the coal deposits; there are lodes of gold, silver, antimony and other metals, but it remains to be shown whether they can be worked profitably. The gold and silver produced in China comes mostly from small leaders and stringers worked by native methods, and affording no criterion of success on a large scale. But mineral resources to be valuable require two conditions: first, quality and quantity, and then reasonable facility to exploit them profitably. Now, we have made it clear, in previous references to the subject, that China possesses a great variety of mineral wealth, from gold to iron, the foundation and the coping of industrial advancement. But the conditions which obtain in the interior—that is, outside of the treaty ports—do not favor the supposition that actual exploitation under existing conditions will often prove profitable to foreigners.

In his letter, Mr. Wilson refers to the Chinese official who is in danger of decapitation for his actions in connection with a well-known company; the fact is, Chang Yen Mou, the director-general of the Chinese Engineering & Mining Company, was appointed by the Chinese government to safeguard the interests of the native shareholders, and shortly afterward he transferred the enterprise bodily to an English company without consulting the interests he was supposed to protect. This incident illustrates the "ways that are dark" for which Ah Sin's countrymen are supposed to be peculiar. All native companies are put under the direction of a government official, a director-general, who is appointed to see that the shareholders get fair dealing; these gentlemen usually fill the subordinate positions with their relatives and henchmen, thereby facilitating the Oriental process known as "squeezing." That is why there are so few native companies in operation to-day. In fact the expense of this method of "protecting" shareholders bears a similitude to the receivers and liquidators in countries supposed to be in the van of civilization. We may add that at Chin Chang Kauliang, about 100 miles northwest of Kin Chow, a native mining company has been at work for 17 years, and employs both steam hoists and pumps. The workings are extensive and are reputed to have been productive in gold, but owing to the large number of officials in charge scarcely 50 per cent of the output ever reaches the company—that is, the shareholders. To Mr. C. D. Jameson we owe a translation of the mining regulations for this—the Jehol—district, which includes all Mongolia and China outside of the Great Wall, and from the portion published on another page of this issue the reader can infer the complicated nature of the steps required to be taken in order to secure mining rights. The whose system of red tape is, however, simplified in practice by the existence of widespread official corruption, which affords a ready

method of arranging details at short order. All mine regulations apparently start out with the supposition that every official is a scoundrel, and in this respect the mining ordinances of China are unique. In these matters the Chinese are not much worse than the Siberian officials, who are their neighbors; both China and Siberia are crippled from an industrial standpoint by a bureaucracy which "squeezes" everything in sight, the native first and then the foreign investor. Corruption is overcome by more corruption and the general result is one not pleasant to contemplate. Until it is lessened, mining investment will proceed gingerly, and only those who have a good grasp of the situation will be warranted in risking their money.

THE UNITED STATES STEEL CORPORATION.

The full report of the United States Steel Corporation for the year 1903 deals with such large figures and extensive operations, that a proper analysis would necessarily occupy much space. The financial part changes very slightly the figures given in the preliminary statement published a few weeks ago. It shows in a way almost startling, the effects of the drop in business and in prices in the iron trade during the second half of 1903, and especially in the last quarter. The net earnings, which reached $23,987,950 in the second quarter of the year, fell to $2,230,776 in the fourth quarter, an amount considerably below the actual requirements of the company, which were, of course, met from the accumulated surplus. This alone furnishes a full explanation for the cessation of dividends on the common stock.

As we have said heretofore, the reaction in the iron trade in the closing months of 1903 was greater than the situation really warranted, and was largely due to exaggerated sentiment. Since the close of the year the trade has been gradually recovering and steadying itself; and there is no doubt that the Steel Corporation will be able to show much better results for the current quarter than for the last. There is no doubt, also, that this improvement will not be great enough to warrant any expectation of an early resumption of dividends on the common stock. There is much more business now than many people expected to see; but it is done on a lower level of prices and at a moderate profit.

Turning from the financial statement with only this brief comment, we find that in 1903 the Corporation's furnaces produced 7,279,241 tons of pig iron, or 40.3 per cent of the total output of the country. Its blast furnaces were unable to supply raw material enough, as is generally known. The proportion of steel made was much higher, the steel ingots made reaching a total of 9,167,960 tons, or 61.3 per cent of the entire production; while the finished products amounted to 7,635,690 tons, or about 60 per cent of the total.

In raw materials, the figures are equally impressive. The iron ore mined by the Corporation directly was 15,363,000, or 46.1 per cent of the estimated production of the United States. If allowance be made for the varying tenor of iron in ores from different districts, these shipments probably represented nearly 55 per cent of the iron-producing capacity. The coke made was 8,658,391 tons, or 34 per cent of the total production. In limestone and other raw materials the figures are quite as large.

The Steel Corporation employs an army of men, the number at the close of the year having been 167,709. The amount paid out in salaries and wages was $120,763,896.

In this report the Steel Corporation adheres to its policy of giving full information to the stockholders in relation to its operations and financial position. It does not, however, give any indications of its future course, under the difficulties of declining activity. Whether its policy will be to follow the market or to try and control it; to meet competition, or to try to crush opposition, can only be learned from the future. At present it looks very much as if there was no definite plan, and the managers were content simply to drift.

MARKET CONDITIONS.

March 16.

The metal markets remain rather quiet, so far as domestic business is concerned, but a more confident feeling begins to be apparent.

Domestic consumers of copper are apparently taking little interest, and are buying only on a somewhat limited scale. On the other hand, business abroad appears to be very active, and foreign consumers have apparently made up their minds that lower prices are hardly to be expected. Exports in February were over 17,000 tons, and up to the present date in March nearly 12,000 tons have been shipped, so that there is little doubt that the total for the month will reach 20,000 tons.

Tin is quiet, with no material change. The same may be said of lead, consumption remaining good. Spelter is firm, with rather a strong demand. In the Joplin ore market buyers have been bidding against each other, with the result that prices for zinc ore have generally advanced.

Silver remains steady, with no important change in the Eastern demand, and only moderate variations in price.

The iron trade begins to show a better feeling, and buying of raw material is on a larger scale. Contracts are now being placed, running up to the end of June, and there is less selling for short delivery. Little or no business, however, has been done for the second half of the year so far. The United States Steel Corporation has taken options on more pig iron from outside furnaces. In finished material, business is better in bars and structural steel, except in the New York district, where the building trade is paralyzed by labor troubles.

The Western coal markets are still unsettled by the talk of a possible strike on April 1. A good deal of delay in transportation from mines is also reported.

The situation in the seaboard bituminous market is a little easier, transportation having improved somewhat.

The anthracite trade still feels the effects of a severe winter, and buying is much more active than it is usually at this season.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The gold-fields of Tierra del Fuego were discovered in 1881 by Lieutenant Serrano, while making a survey of the region. Most of the gold is obtained at present from Chilean territory, this region being more accessible than the portion belonging to Argentina.

Platinum occurs with non-metals in two compounds, sperrylite ($PtAs_2$) and laurits (RuS_2). The latter mineral is of rare occurrence, and sperrylite is found only in the Sudbury district of Canada and the Rambler mine in Wyoming.

What is known as the platinum group of metals comprises palladium, rhodium, ruthenium, platinum, iridium and osmium. The first three metals named are of little importance commercially, although palladium is used to some extent in the arts.

Where wire ropes have to bend around wheels, drums, or curves, the outer fibers of each wire, as they accommodate themselves to the curve, are in tension, and the inner wires in compression, while the center, or neutral axis, is unchanged. As a consequence, it may be assumed that the more flexible a rope is—that is, the less resistance in compression and tension offered in each wire—where it is subject to much bending in work, the better will be the results; provided that flexibility is not attained by using such fine wires that the wearing capacity of the rope is affected.

For various reasons, after remaining in abeyance for a time, the questions connected with economy in the use of steam are cropping up again for discussion; and men are asking whether the steam engine is really played out, and soon to be superseded by gas, or oil, or alcohol engines. The apparently great economy attained by some types of gas engine, and the successful introduction of internal combustion engines of very high power, driven by furnace or producer gas, had the effect, at first, of discouraging attempts at improvement in the steam engine. The introduction of the turbine has, however, directed attention once more to steam. Steam engineers begin to take heart again, and set themselves to make further improvements. Superheating and better designs are doing good work; and there is no reason to doubt that the steam engine will hold its own for a long time to come against its rivals.

THE ENGINEERING BUILDING.

The Conference Committee on the Engineering Building has issued a statement required by the changed conditions resulting from the refusal of the American Society of Civil Engineers to join in the use of such a building. It opens with the following brief, but emphatic, letter from Mr. Carnegie, which is dated March 14; the comments of the committee following:

"Gentlemen of the Mechanical Engineers; Institute of Mining Engineers; Institute of Electrical Engineers; Engineers' Club of New York:

"It will give me great pleasure to devote, say, one and a half million of dollars for the erection of a suitable Union Home for you all in New York city. With best wishes. truly yours,

(Signed) "ANDREW CARNEGIE."

It may be stated that the three national engineering societies named and the Engineers' Club, which, by reason of its widespread membership is also increasingly national in character, have, with the unanimous approval of all the memberships, already taken active steps to put into being the splendid trust for engineering thus created by a man whose own career has illustrated the upgrowth of the engineering and industrial arts in America. The total amount involved is not less than $2,500,000, for, in addition to the amount given by Mr. Carnegie, a sum of over $500,000, represents the investment in land for the three societies on West Thirty-ninth street, between Fifth and Sixth avenues; while the Engineers' Club has also acquired valuable land for its own purposes on West Fortieth street, immediately facing the New York Public Library. The Union Engineering Building will probably be 12 stories in height, and will be laid out expressly with an eye to the services required of it. In many respects it will be unique. The three national engineering societies made trustees by Mr. Carnegie will have large headquarters there; and already several kindred bodies have made urgent requests for accommodation. There will be four or five auditoriums of different size, notably one to seat 1,200 to 1,500 persons; and all will be appropriately equipped for scientific meetings, lectures and demonstrations. Above all, there will be an engineering museum and a noble library hall, where all the libraries concerned will be grouped and consolidated, yet each section administered by its respective society librarian and each adding to its own specific literature, so as to avoid duplication of outlay for books or periodicals. It is proposed, moreover, to co-operate intimately with the New York Public Library, near by, along these lines of work, so that nowhere else in the world can the student or practitioner find thus freely available the whole literature of engineering and technical industry. The three libraries assembled in this manner will even at the outset include some 50,000 volumes, many of them great rarities of inestimable price.

The three societies, each of course maintaining its identity and autonomy, will themselves need considerable room in the new building, which it is hoped to have ready in 1906. They have a total membership to-day of over 9,000, and are growing at the rate of between 10 and 15 per cent annually. They administer a total income of $135,000 annually and in assets of all kinds have property to the value of between $250,000 and $300,000, a sum to which the gifts of individual members are now adding rapidly. The sister technical societies asking for quarters and facilities represent also another great body of over 5,000 members, engaged in all branches of civil, mechanical, electrical, municipal engineering, etc. Large, therefore, as the Union Engineering Building, with its frontage of 125 ft. on five lots, may seem, it bids fair from the start to find every inch put to fructifying use. The Engineers' Club building, a separate entity, will immediately flank the Union Building, the two sharing the same resources of light, heat and power, and being most advantageously situated for intercommunication and mutual social benefit. The club, with a long waiting list, has just increased its membership to 1,200, and administers a budget of about $120,000 a year. The buildings, facing thus on two streets, are to harmonize as to architecture, as they do virtually in function, as homes of engineering, and their central position commanding all lines of travel at the very heart of the city, insures the acme of convenience to visitors from outside the city or from abroad, as well as to all local members.

The three societies provide the land, but in the meantime Mr. Carnegie has promptly acquired it for them. The leases run out about July 1 and work will then begin forthwith and be pushed ceaselessly to completion, as the building is in reality sorely needed by the bodies that are to occupy it, and that now chiefly occupy rented quarters ill-suited to their purposes. The Engineers' Club has also already made purchases of land for itself on West Fortieth street, not far from the new Republican Club opened recently. Plans for the architectural part of the undertaking have already been drafted, and the architects will soon be selected. The representatives of the four bodies interested as the direct beneficiaries and trustees of Mr. Carnegie's splendid gift to engineering are as follows: American Society of Mechanical Engineers—F. R. Hutton, C. Wallace Hunt, J. M. Dodge. American Institute of Mining Engineers—A. R. Ledoux, Theodore Dwight, C. Kirchhoff. American Institute of Electrical Engineers—C. F. Scott, S. S. Wheeler, Bion J. Arnold. The Engineers Club—J. C. Kafer, W. H. Fletcher, T. C. Martin.

THE MINERAL PRODUCTION OF GREAT BRITAIN.

We are indebted to the courtesy of Sir Clement Le Neve Foster for advance proofs of the tables showing the mineral production of Great Britain from coal mines and metalliferous mines for the year 1903. The report from the open workings, which come under the Quarries act, has not yet appeared.

In examining the statistics of output given in the tables below, it must be borne in mind that the figures do not, in all cases, represent the total production of the mineral for the year. Large quanities of several important minerals, such as iron ore, limestone, sandstone, slate, clay, etc., are obtained from open workings or quarries, under the Quarries act, and from other open workings, returns from which are not complete. The totals for coal and for the ores of copper, lead and zinc, may, however, be regarded as substantially complete.

The following table shows the production of minerals from mines coming under the Coal Mines act last year, as compared with the output of 1902, the figures being in long tons:

	1902.	1903.		Changes.
Coal	227,084,871	230,323,391	I.	3,238,520
Clay and shale.	161,053	219,018	I.	57,965
Fire-clay	3,013,095	3,066,835	I.	53,740
Igneous rocks.	.....	2,646	I.	2,646
Iron pyrites...	7,551	8,314	I.	763
Iron ore.....	7,214,310	7,471,822	I.	257,512
Limestone	33,346	38,514	I.	5,168
Oil shale.....	2,107,534	2,009,602	D.	97,932
Petroleum	25	.....	D.	25
Sandstone and ganester	95,914	102,540	I.	6,626

Adding the iron ore from metalliferous mines, we find that the total so far reported for last year was 9,077,690 tons, an increase of 162,969 tons over 1902. To this is still to be added iron ore from quarries.

The increase in coal was 1.4 per cent. Of the coal raised in 1903 exports amounted to 46,622,700 tons, besides which 16,799,848 tons were sent abroad for the use of steamers engaged in foreign trade. Thus 63,422,548 tons, or 27.5 per cent of the total, were used beyond the limits of the United Kingdom.

The total number of persons employed in mines under the Coal Mines act was as follows:

	1902.	1903.	Changes.
Underground	662,901	676,746	I. 13,845
Above ground	161,890	165,320	I. 3,430
Totals	824,791	842,066	I. 17,275

The number of fatal accidents in coal mines in 1903, as already reported, was 1,067; showing an average of 1.267 deaths from accident per 1,000 persons employed in the mines.

The production from mines under the Metalliferous Mines act is reported as follows, in long tons:

	—1902—	—1903.—	Changes.
Arsenic	2,131	902	D. 1,229
Arsenical pyrites	829	57	D. 772
Barytes	22,908	23,671	I. 763
Bauxite	9,047	6,128	D 2,919
Chalk	8,666	6,885	D. 1,781
Chert and flint	2,929	3,690	I. 761
Clay and shale	95,963	112,848	I. 16,883
Copper ore and precipitate	6,112	6,867	I. 755
Fluorspar	4,970	10,697	I. 5,727
Gold ore	29,953	28,600	D. 1,353
Gypsum	170,196	176,980	I. 6,784
Igneous rocks	93,664	90,236	D. 3,428
Iron ore	1,700,411	1,605,868	D. 94,543
Iron pyrites	1,617	2,739	I. 1,122
Lead ore	23,615	25,635	I. 2,020
Limestone	571,721	573,011	I 1,290
Manganese ore	1,278	818	D. 460
Ocher and umber	8,423	5,658	D. 2,765
Rock-salt	162,193	167,769	I. 5,576
Sand	13,075	15,053	I. 1,978
Sandstone	201,760	183,520	D. 18,240
Silver ore	.....	58	I. 58
Slate	159,540	164,278	I. 4,838
Tin ore (dressed)	6,698	6,499	D. 199
Uranium ore	52	6	D. 46
Wolfram	9	272	I. 263
Zinc ore	25,060	24,888	D. 172

The total of all minerals taken from metalliferous mines last year was 3,243,633 tons, against 3,322,820 tons in 1902; showing a decrease of 20,813 tons. In addition to the iron ore above reported, there is a large quantity taken from open workings, which comes under the Quarries act; this is not yet reported.

The number of employees in metalliferous mines is reported as follows:

	1902.	1903.	Changes.
Underground	18,035	17,571	D. 464
Above ground	12,777	12,251	D. 526
Totals	30,812	29,822	D. 990

The number of fatal accidents reported in 1903, as given in the ENGINEERING AND MINING JOURNAL, February 4 last, was 25; showing an average of 0.838 per 1,000 persons employed.

Aside from the large profits earned by corporations engaged in the nitrate of soda industry, the Chilean government, through its export tax, has collected $273,032,349 from 1880 to 1903. During this period the exports amounted to 22,095,148 tons, showing an average taxation of $12.35 per ton.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

MESABI RANGE.

The Editor:

Sir.—In the kind review of my monograph on the Mesabi Iron Range (No. XLIII of the U. S. Geological Survey) in the JOURNAL for August 1 there were references to results previously reached by the Minnesota State Survey which called out, in your number of September 5, a letter from H. V. Winchell in defense of the work of the Minnesota Survey. This has resulted in giving the impression that the writer in his monograph criticized the Minnesota Survey and that Mr. Winchell had vigorously defended it. I would call attention to the fact that this is not the case; indeed the statements made by Mr. Winchell in his letter are almost fully in accord with my references to the Minnesota Survey in the Mesabi monograph. Aside from certain conclusions as to the volcanic nature of the ores reached by N. H. Winchell, the detailed work of the U. S. Geological Survey may be said to have resulted in the general confirmation—with such additions and minor modifications as would naturally be expected to follow from later and more detailed work—of the earlier work of Messrs. H. V. Winchell, J. E. Spurr and U. S. Grant. C. K. LEITH.

Madison, Wis., Feb. 29, 1904.

FEDERATION OF TECHNICAL SOCIETIES IN GREAT BRITAIN.

The Editor:

Sir.—I have read the letter from an "Old Subscriber," appearing in your issue of September 5.

The Institution of Mining Engineers was founded in 1889 in order to obtain a more general recognition of the importance and value of the profession of a mining engineer. A general scheme was evolved, and, while preserving the corporate individuality of each Institute (which is so valuable), it affords a means of communication between the various mining districts of Great Britain, the Colonies and India, and enables each to acquaint itself with the superior or peculiar practices of others; and the most valuable consequences must therefore follow from such a universal circulation of mining knowledge.

The proceedings of the associated Institutes are published in the *Transactions* of the Institution of Mining Engineers, and each member thus receives a mass of useful information without further cost than the annual subscription to his own associated Institute.

It is needless to add that the advantages of all members would be materially enhanced if the Institution of Mining and Metallurgy were also associated with the Institution of Mining Engineers.

There can not be the slightest doubt that the Institution of Mining and Metallurgy and the other mining societies of Great Britain are, as one, united in promoting and advancing the interests of the profession, and surely if it be to the interest of the members of six of these "provincial" societies to associate themselves together, it would also be more advantageous to all if the "younger" society joined and strengthened the Institution of Mining Engineers. It may or may not be that the Institution of Mining and Metallurgy investigates the qualifications of would-be members more rigidly than the six associated societies, but it should be remembered that in the majority of cases managers of mines of stratified minerals in this country are holders of certificates of competency, granted after examination. In any case, a joint committee would speedily assimilate the rules of the Institution of Mining and Metallurgy and of the Institution of Mining Engineers (which are adopted by the associated societies) if it be found that one or other has the higher and more desirable qualifications for membership.

Prior to the formation of the Institution of Mining Engineers, in order to obtain the *Transactions* of the present six associated societies, one had to become a member of all of them, and pay £10 19s. per annum, but the same can now be obtained for a payment of £1 10s. or £2 2s. to only one of the associated societies.

There can be no doubt that the accession of the Institution of Mining and Metallurgy would materially enhance the value of the *Transactions* of the Institution of Mining Engineers; and the members of the Institution of Mining and Metallurgy would receive in addition to their own *Transactions* those of the Institution of Mining Engineers, while their annual subscription would not be increased. M. WALTON BROWN.

Newcastle-upon-Tyne, Feb. 19, 1904.

MINE VENTILATION.

The Editor:

Sir.—I notice, in a recent issue of your JOURNAL, an account of the means of ventilation used in the Simplon tunnel. The temperature in the tunnel has risen gradually until the water has attained a maximum of 133° F.; necessarily, therefore, the rock and air must be at about the same temperature. In order to enable the men to work with vigor in such a heat they are supplied with air, which is first cooled by water-spray to 20° or 25° F. below the tunnel temperature, and then sent to the tunnel-face which, in one opening, is 4.25 miles away and in the other 6.25 miles. I assume this is done by means of a galvanized iron pipe, as it is doubtful if a wooden box would be used on a work lasting so long as this great bore; if so, the conditions merely repeat those of the Comstock mines, where this system of ventilation was first devised.

Twenty or thirty years ago, when mining as an art was less developed than it is now, our predecessors were discussing with much interest the question whether the Comstockers had done well to reverse the former method of ventilation and blow air into a mine instead of sucking it out, and I believe that I was the first to point out that they had, by practical tentative methods, found their way to the correct, and probably the only rational, mode of sustaining men who have to work under unfavorable conditions of heat. I remember that a European reviewer of my book pointed out the applicability of this system of ventilation to the long tunnels through the Alps and said that it might be possible in future to choose a short line under high mountains where the heat would be great in preference to a longer line selected to avoid those elevations.

The absence of rational consideration of this subject until the Comstock men showed the way is indicated by the measures taken to refresh (?) the men in another of the Alpine tunnels. At one time cars loaded with quicklime were run in to absorb the moisture, but they heated the air to an insupportable point. At another time cars loaded with ice were tried, but the same insupportable conditions were produced, for the air became so charged with moisture that the men were almost suffocated.

The Comstock method was to make every man his own refrigerator by blowing upon his half-naked body air that was deficient in moisture. The evaporation of his perspiration cooled the skin so thoroughly that the only part which needed attention was the head, and this was provided for by wearing a skull cap of cotton cloth which was dipped in water frequently. This was really a great discovery, and the conduct of operations at the Simplon tunnel shows that my reviewer was right in predicting that the Comstock miners had set the pattern for the world.

At some of the Comstock mines air was sent down from the surface, but the operation of the system was exhibited more neatly in others, where the air current was produced by a small blower worked by compressed air. No effort was made to get cold air, nor especially dry air. The blower was set up near the shaft, where the temperature might be 90° F., and the air was driven through an 11-in. galvanized iron pipe hanging in the drift, where the temperature was often 108° or 110° F. When it reached the men, some hundreds of feet away, it had about the same temperature as their working place, but the rise of temperature had not been accompanied by absorption of moisture. The air was, therefore, in condition to take up the moisture of their bodies with the well-known refrigerative results. This arrangement was so effective that if the blower was speeded up a little, the men felt *cold* (110° F.) and came out to shut off the compressed air.

One accompaniment of this system was the unlimited consumption of ice water, of which at least three gallons daily was the average amount drunk by each man. In one company's annual report, the cost of powder was put down at $50,000 and of ice at $200,000!

It seems to me that the American miner may fairly lay claim to the honor of having established the important art of ventilation upon a correct theoretical basis.

I cannot understand how the air at the working faces of the Simplon tunnel can be "cool and fresh," as the writer in the London *Times* says it is. It has been carried for miles through pipes which hang in a tunnel where the temperature increases gradually up to 133° F., and the air thrown on the men must have about that temperature. As far as cooling the air is concerned, I would say that the absorptive powers of air raised from, say, 50° F. to 125° F. would come near to freezing the men solid, if it were not that this preliminary cooling is done by water-spray, so that the air starts on its way saturated with moisture. It seems to me that the engineers of the Simplon have not yet grasped the essential principle which underlies this system of ventilation—which is not to supply *cold* air, but *non-*

saturated air. Anyone who has worked in the Colorado desert in July knows that though the thermometer stands at 120° to 122° F. in the shade and probably 150° in the sun, the skin is remarkably cold to the touch, and labor there probably would not be burdensome if the head could be kept as cool as the body.

JOHN A. CHURCH.

New York, March 8, 1904.

MINING IN CHINA.

The Editor:

Sir.—I have read with much interest the editorial and discussion on 'Mining in China,' which recently appeared in your columns. I fear that my contribution may be rather tardy to be included in that discussion, but I realize that if the mineral resources of China are not well understood by the mining world it is due, in part, to the fact that those who have studied them have not published their results, and in a sense, have failed in the duty they owe their brother miners. At the same time, others have heralded to the world a thousand misconceived ideas gathered in a flying visit to the coast of this empire, thus committing a far greater error than those who have failed to publish their information. It is quite the exception to read any article on China which does not contain unpardonable mistakes, if not downright misstatements.

I think I am safe in saying that, while China has wonderful resources and great possibilities, she will prove a disappointment to those who are now entertaining the sanguine hopes expressed in your articles. We hear a great amount of discussion as to the chances of investment and the business opportunities to be expected "when China is opened to foreign enterprise," but if anyone is sufficiently interested to turn the newspaper files and read the articles written on this subject immediately after the signing of the treaty of Nanking, August 29, 1842, he will find the same editorials, almost word for word, as are now being published. China was to be thrown open to foreign enterprise and "the long secluded empire takes rank among the nations of the earth and becomes of one family with them."[1] While much has been accomplished since these articles were written, it is not to be concealed that the writers of them were disappointed. The fact is, China is not to be initiated into western methods in a day, and her conservatism, which has kept western methods out of the country for so long, will probably be able to retard their introduction so that her conversion will be very gradual.

It is safe to assume that those undertakings which succeed in the future will follow much the same methods as the present successful companies, that is, by searching out a good field, applying for the concession, bribing every government officer all the way up to Peking, to assist in obtaining the concession; and once the company has secured its privileges it must work persistently in the face of many obstacles until it overcomes them or fails. The world has not yet produced a country in which every mining and railroad enterprise must succeed, and China will certainly not be an exception.

[1] "Chinese Repository," Vol. XII, No. 1, January, 1843.

It may not be generally known that for years foreign[2] mining methods have been in use in China, and not only has it been possible for foreigners to obtain and work concessions, but the Chinese themselves have in numerous instances formed companies for the working of mines by foreign methods, in at least two instances for constructing railways, and one native company owns and operates a large number of steamships on the China coast. As early as 1878 the Chinese Engineering and Mining Company commenced work in the Kai Ping coal basin near Tientsin. This was a Chinese company and from the first it employed foreign mining methods, and engaged foreign engineers. Later it was promoted as a British concern. Some time after this company became a commercial success, a native company opened the gold mines at Ping Tu, in Shantung province. A foreign staff was employed and a ten-stamp mill was erected. The enterprise proved a failure because of the pernicious form of dishonesty known as "squeezing" on the part of the native managers, who retained control of the business management of the enterprise.

The next effort was the opening of the Ku Shan Tzu silver mines in Mongolia, 250 miles northeast of Peking. A concentrating plant and smelter were erected under the supervision of well known and capable American engineers. The mine, while small, was rich, and the enterprise would certainly have been successful had the foreign staff been in control of the finances and business management. The natives, however, conducted the business of the company, and the foreigners had charge only of the technical work. Anyone experienced in China could predict the result. The Chinese officials employed all of their relatives at high salaries and they, in turn, employed all of their relatives, each individual "squeezing" a portion of the money handled in his department until the foreign staff finally resigned. Since then several native companies have been organized to operate the gold mines in that portion of Chi-li province which lies north of the Great Wall. These companies have used a certain amount of foreign machinery and method, but all have been failures except from the standpoint of the Chinese employees.

There are many difficulties to be met in China which will prove to be serious obstacles to foreign enterprise, and these difficulties will probably endure as long as China is an independent country, for they are simply Chinese characteristics. Among these I may mention the tenacity with which Chinese, and especially the official classes, cling to their ancient methods of government, and to their fossilized commercial systems. I think it would be difficult to find one native official in China who, at heart, is really in favor of introducing foreign methods into the country. The statement will probably be challenged by a few of your readers who have been in China, but the man they will certainly point out as a pro-foreign official, and who has always been accredited with advanced ideas, is at the present moment pressing the Throne to decapitate the official who brought about the transfer of the Chinese Engineering and Mining Company to the British organization now controlling that enterprise.

Another obstacle to mining enterprise in China is the inherent dishonesty of the Chinaman. I note in a recent contribution to your columns a statement that the Chinese invariably act in good faith toward those foreigners who have invested in China, and that the Chinese are exceptionally honest and upright in their transactions with each other and with foreigners. Perhaps my own experience has been exceptional, but I thought it was a matter of common knowledge that from the western point of view, there are probably very few honest Chinamen to be found. This may seem an extreme view, but it can be explained by the fact that in China an embezzlement is regarded in the light of a commission. This species of dishonesty is commonly known among foreigners in China as "squeezing." Thus, a native servant is sent into the street to purchase a broom, for which he pays ten cents; he reports to his master that the broom cost fifteen cents and serenely "squeezes," or, as we would say, misappropriates, five cents, which he considers in the light of a commission on the transaction. I have never known a servant in China who did not practice this dishonesty. In the same way probably every official in the Imperial service, whether his position be high or low, will be found to be "squeezing" the taxes, revenues and other public and private funds intrusted to him. What would be regarded among western nations as bribery, is considered either in the light of a present or as a fee in China. To obtain and work a concession in China, every government official who can possibly have anything to do with the matter, directly or indirectly, must receive his fee, or, as we would say, his bribe. It is true that the Chinese have one honest principle which is noteworthy: they will rarely permit a guarantor or bondsman to suffer because of their own default. In letting contracts in China a contractor is made to furnish guarantors. These he can always find, as they are practically certain that they will not be called upon to suffer any loss. The contractor will many times plead to be released from a bad contract, but he will rarely run away or refuse to go on with the work. This is a redeeming characteristic of the Chinaman in business.

As one of your contributors points out, China is not only a civilized, but a thickly populated country, which feature will be greatly in favor of the development of mining enterprise in the future. But as against this is the serious fact that the Chinese are phenomenal organizers, and can combine in any community so as to place wages and the price of supplies at their own figure. I have known of many instances where the Chinese have combined against a mining company making it necessary for the company to pay nearly twice as much for its horse fodder, timbers, etc., as would be paid by any coolie in the street. It is useless to send Chinese purchasers—*compradors*, as they are called—in such cases, as they simply "squeeze" the difference between the purchase price and the price the company must pay. In the same manner the transportation of supplies and machinery is very expensive. The roads are unspeakable, the native carts are not adapted to hauling heavy machinery. The government does very little toward the improvement of roads or bridges, and the taxes levied for this purpose are regularly "squeezed" by the officials. In addition to these difficulties the carters and packers will generally combine to raise the

[2] Among Chinese and Europeans resident in China all other nations are referred to as "foreign" and their citizens as "foreigners."

charges. Where the company operates on a canal or waterway, the junkmen arrange an exorbitant schedule of freights. I may mention in this connection that China's system of rivers and canals, while of inestimable value in the development of the coal and iron fields of several of the provinces, does not extend to those mountainous portions of the country containing the most promising gold, silver and lead deposits, and we can probably include in in this statement copper and mercury. In these districts transportation will always be high, and produce and supplies will be expensive, as the mountains, although cultivated where possible, are not very productive.

Enough has been said of the difficulties which foreign enterprise will encounter in China. There are many others which cannot be dwelt upon within the limits of a short article. None of these will be insuperable obstacles to the men who do most for the mining industry of new countries. It is to be hoped that they will tend to discourage the "wild cat" promoter. Too much confidence must not be placed in China's immediate future. The development of her resources will certainly be accomplished, but in a leisurely manner. The men who will succeed are those who do not expect to "strike it rich" in a day, but who come here with the necessary financial backing and with the determination to make a success of any enterprise they may undertake. Small company promoters with no capital will probably fare badly. China has few possibilities for the moneyless man, and holds out few promises to the prospector. The natives themselves have long since discovered the mineral deposits, and have done much primitive working. Intelligent inquiry is all that is necessary for prospecting in China, but to obtain a concession requires ready money. G. B. WILSON.

Tong Shan, North China, Jan. 17, 1904.

REVOLUTIONARY METALLURGY.

The Editor:

Sir.—Under the date of February 11, an editorial in your paper, headed 'Revolutionary Metallurgy,' forcibly calls to mind a number of experiments I had occasion to make a little over a year ago. The results are decidedly against some of the statements advanced in the editorial, as well as one in particular, attributed to the 'Metalia Ltd.'

In dissolving out Fe_2O_3 with HCl from a residue containing among other things metallic gold, I found the acid solution to carry gold in very appreciable quantities. It is sometimes customary in the Lake Superior region to employ a concentrated solution of $FeCl_3$ strongly acidulated with HCl to dissolve the metallic copper in an arsenic determination. It occurred to me that the solution of the gold might be explained by the action of the $FeCl_3$ formed, and I determined to try the effect of that compound on finely divided metallic gold. I first prepared the gold by precipitating it from the solution of the chloride with $FeSO_4$ and afterwards used that obtained from parting some assay buttons containing a large excess of silver. In both cases I obtained the following results: A cold solution of $FeCl_3$ concentrated, or dilute, strongly acidulated with HCl, or neutral, appeared to have no effect on the gold. When the solution is raised to the boiling point, the gold is distinctly soluble in all four cases.

After finding that the gold was soluble in a dilute, as well as a concentrated solution, I used a solution carrying from 3 to 5 per cent $FeCl_3$, slightly acidulated with HCl, to prevent the formation and precipitation of the basic chloride on boiling.

A piece of silver foil placed in a 3 per cent solution and boiled for 15 minutes turned black from the coating of silver chloride formed. It is a well known fact that silver chloride is soluble in a solution of common salt, and on saturating the solution with the latter and boiling for the same length of time the silver was entirely dissolved.

Galena was then finely pulverized in an agate mortar and 200 mg. placed in a flask containing 100 c. c. of a 5 per cent solution of $FeCl_3$, saturated with NaCl and slightly acidulated with HCl. This was placed on an oil bath and the temperature raised to the boiling point of the solution. At the end of an hour all that remained undissolved was a fluffy, yellow-brown mass of sulphur carrying traces of lead. At no time during the experiment was any H_2S given off. The reaction is apparently:

$$2\ FeCl_3 + PbS = S + 2\ FeCl_2 + PbCl_2.$$

With an excess of PbS the reduction of the $FeCl_3$ can be easily followed as the solution gradually becomes colorless. On titrating the $FeCl_2$ with permanganate the results were slightly in excess of the theoretic amount.

Sphalerite proved to be much more refractory than the galena. After boiling for three hours only 75 per cent of the zinc was in solution. On examining the dried residue under the microscope, the larger irregular fragments of sphalerite were easily discernible, scattered among the sulphur. Argentite, polybasite, chalcocite, bornite, chalcopyrite and pyrargerite are attacked more or less slowly by the solution. A free-milling gold ore gave small extractions.

I was unable to finish these experiments, which accounts for the fragmentary character of these remarks. H. P. BOWEN.

La Florencia, Mexico, March 4, 1904.

CORRECTION.—In the letter describing 'Pyrite Smelting at Bingham, Utah,' which appeared in this column in our issue of March 3, the author informs us that the last paragraph should read that "The production of the plant is 200,000 lb. copper per week." not per month. The mistake was in the original manuscript.

NITRATE DEPOSITS IN TUNIS.—What is believed to be an extensive deposit of a good quality of nitrate of soda, fit for mining, has been discovered east of Timinum, near the Feggaguira oasis. Other discoveries of equal importance have been made lately in the so-called south oases of the Sahara in Tuat, Gurara and Tidikelt, by military attachés. Unfortunately these deposits are remote from adequate transportation facilities that would make them of commercial value. It is intimated, however, that the completion of the Trans-Senegal Railway, now being constructed along the Zousfana river, may aid materially in developing the nitrate beds.

MINING REGULATIONS FOR THE JEHOL REGION, CHINA.

The special issue of regulations covering mining in the Jehol district is suggestive of conditions in China. We publish a portion of them. They apply only to that part of the Chinese dominions outside of the Great Wall, and not in Manchuria. It is a region which is said to be traversed by several gold-bearing belts, hitherto worked only by native methods. In matters not covered by this special ordinance, the regulations adopted, in response to the memorial of the Board of Foreign Affairs and the General Bureau of Railways and Mines, must be observed.

1. *On Reporting to the Chief Administrative Bureau.*—The Military Lieutenant Governor of Jehol, having memorialized for the establishment of a Bureau of Administration, to which the control of mining operations would belong, all applications for permission to open mines, and presentation of agreements for inspection and of statements as to capital must be made at said bureau, and in no case will it be permitted to visit the private homes of deputies for the purpose of requesting intervieys on the pretense that the offices are closed. The object of this rule is to break up corrupt practices. In the presentation for reports, or the payment of taxes, the same method shall be observed.

2. *Notifying the Board of Foreign Affairs.*—All applications for the opening of mines must be carefully examined by the Military Lieutenant Governor, to see whether or not they are entirely in accord with the regulations in force, and if he shall approve, he shall forward them to the Board of Foreign Affairs for the examination. Only after he shall have received its reply approving them will it be permitted him to issue the permit to mine. All applications made to the Board of Foreign Affairs must also be communicated to the Military Lieutenant Governor, who is authorized to inquire whether or not there may be any attempt to mislead or any difficulty in the way. Only after he shall reply, giving his approval, will it be permissible to issue the permit to work. Although the applicants may be Mongol subjects, they must observe the same rule.

3. *Reporting Amount of Capital.*—It must first of all be stated clearly and in detail in the application whether the capital is the applicant's own, or composed of shares owned by Chinese or of a number of foreign-owned shares. There must not be allowed any concealment or deception leading to corrupt practices.

7. *Experimental Mining by the Officials.*—There is a great deal of mining land in Jehol. The need of money is very urgent. If reliance is made upon the operations of the mercantile classes only, the revenue will not be much benefited. Henceforth let places be selected where there are good indications for mining and where no merchants are operating, or where they have operated, but abandoned the mines because of losses incurred, and let the chief administrative bureau send deputies to make a temporary trial of mining by native method. The capital needed may be appropriated from the revenues received from taxes on mines, the board revenue being notified and action taken in conjunction with said board. All profits derived from the working of such mines shall be paid over to the Imperial Government. When they prove to be successful

their development may be taken into consideration, and after one year a report on all of them shall be made in one memorial to the Throne. The deputies shall be paid good salaries, and should there, on examination, prove to be any corruption, they shall be impeached.

8. *The Definite Selection of a Locality.*—The occupation of mining properties by public notice (merely and without definite restrictions as to their extent) is practically to obtain the advantage of monopoly. Hereafter those making application to open mines must definitely select a locality by name and a large mine will be limited to twenty *li,* and a small one to ten *li.* It will not be allowable to select in advance and at one time a number of places outside these limits. Only after the place being operated shall have paid royalty (or taxes) may the proprietor make application for another place, when, if there be no obstacles in the way, he shall be permitted to operate such a place.

9. *As to Clearly Distinguishing the Boundaries.*—The boundaries of a mine must be clearly defined. If the boundary between two mines is not clearly indicated, it will be difficult to avoid mutual trespass. Hereafter no new mine will be permitted to extend its boundaries to within less than 20 *li* of the opening of any old mine, lest quarrels should arise.

11. *Prohibition of Illicit Transactions Between Officials and Merchants.*—If, after permission to work a mine has been granted, either the funds should prove insufficient for developing it, or the mine should become exhausted, a report must be made requesting that the mine be closed. It will not be allowable to make any secret transfer. Should it be desired to add new shares or transfer to other parties, and there be nothing at all of an illicit character in the transaction, it will be necessary to make application openly in accordance with the new regulations and request permission to act in the matter just as in the case of the first application. Only after the Board of Foreign Affairs shall have been notified and their approval received, the permit issued and the additional fees paid will it be permitted to proceed in the matter. Those who disobey will be punished.

13. *Restrictions as to the Operation of Mines by Officials.*—When mines of various sorts have been operated by officials stationed in the locality many corrupt practices have resulted. Henceforth this is entirely prohibited. Should there be any officials desiring to operate mines, the matter must first be reported to the board (of civil offices) that the said officials may be removed from the service of the province. If subordinates in these local *yamens* desire to engage in mining, they must be ordered first to resign. Only in this way can the said officials and subordinates be permitted to engage in these operations. As to the reception of shares as presents, this must be even more strictly forbidden. Any persons shown to be disobeying this prohibition will be punished.

MINING COUNTRY NEAR TIEN-PAU-SHAN.

METAL PRODUCTION OF COLORADO.

The report of the Bureau of Mines of the State of Colorado for the year 1903, which has been received just as we go to press, gives the following statement of the metal production of the State, and its value for that year:

	Quantities.	Values.
Gold, fine oz.	1,054,252	$21,605,359
Silver, fine oz.	13,245,483	7,079,711
Copper, lb.	7,809,920	1,033,643
Lead, lb.	101,513,414	4,301,123
Zinc, lb.	80,616,000	4,353,264
Total value		$38,373,100

In our issue for January 7 we estimated the gold output at $22,000,000, which is, it will be seen, very close to the actual amount now presented. The report shows, as compared with 1902, a decrease of $6,911,769 in gold production, which was due to the falling off in Cripple Creek and some other districts. In silver there was also a decrease amounting to 2,696,220 oz. The copper production was less last year by 654,018 lb.; while lead also showed a small decrease, 4,789,960 lb. In the zinc production, however, there was a large increase, amounting to 28,033,490 lb. By counties the heaviest falling off was in Teller county, which includes the Cripple Creek district, the decrease there accounting for almost the entire loss in gold production.

Notwithstanding the decreases shown the metal production of the State was still very large, and it may be hoped that, with the settlement of the labor troubles now affecting mining the present year will show an advance over the last.

GERMAN IRON PRODUCTION.—The output of the German blast furnaces in January is reported by the German Iron & Steel Union as below, in metric tons:

	1903.	1904.	Changes.
Foundry iron	144,405	159,155	I. 14,750
Forge iron	72,128	63,173	D. 8,955
Steel pig	77,255	52,862	D. 24,393
Bessemer pig	26,857	41,916	I. 15,059
Thomas (basic) pig	471,408	513,947	I. 42,539
Total	792,053	831,053	I. 39,000

RUINS OF CHEMICAL LABORATORY AT TIEN-PAU-SHAN.

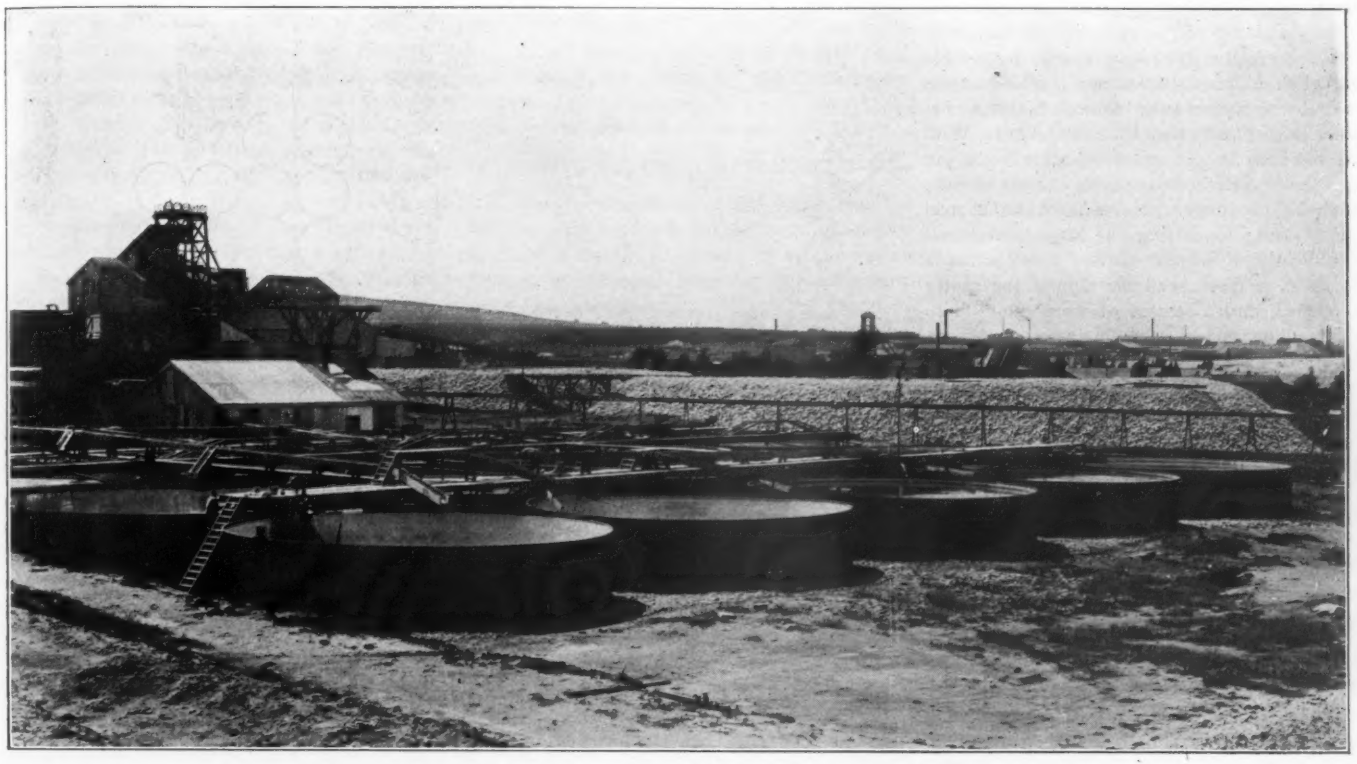
Steel pig includes spiegeleisen, ferro-manganese, ferro-silicon and all similar alloys. The total increase shown this year was 4.9 per cent.

THE SLIME PROBLEM.

By T. LANE CARTER.

It is assumed that the reader understands what constitutes 'slime' in the stamp-milling of ores; if not, a succinct resumé of various definitions can be found in Mr. W. J. Sharwood's paper, 'What Constitutes a Slime,' in this JOURNAL, under date October 10, 1903.

In the early days on the Rand slime was left severely alone, but was stored by dams. The treatment of these accumulations is now in hand on several mines. When treated alone considerable difficulty is experienced in getting satisfactory results, but when mixed, in the proportion of 10 per cent with current pulp, a good extraction is obtained. Grass and long weeds have covered some of this old slime, and the organic acids from the vegetation complicate matters.



ONE OF THE OLD SLIME PLANTS, WITH FLAT-BOTTOM VATS.

The T-Shaped Decanter Used Can Be Seen in the Tank Near the Kaffir.

In the treatment of accumulated slime, the material is carried, by an endless rope-haulage system, to a vat where it is thoroughly puddled. The coarser portion of any intermixed sand settles to the bottom; this is cleaned out periodically and sent either to the mill to be re-crushed, or to the sand-vats. About 0.75 lb. of lime per ton of slime is used to neutralize any acidity; a thorough aeration is also obtained. When well mixed the pulp is run to the tailings wheel, and is lifted with the stuff from the mill to the top of the vats; thence it goes to the spitzkasten, the sand being removed for separate treatment. The old slime assays as much as 6.5 to 7 dwt. on some mines, the high value being due, no doubt, to the amount of sand mixed in with the slime.

Soon after slime-plants went into operation, differences between theoretical and actual extractions were noticed. The probable reasons for the discrepancy have been pointed out.[1] They are inaccurate assaying, and incorrect estimation of tonnage. The specific gravity of slimes on the Rand averages between 2.5 and 2.7.

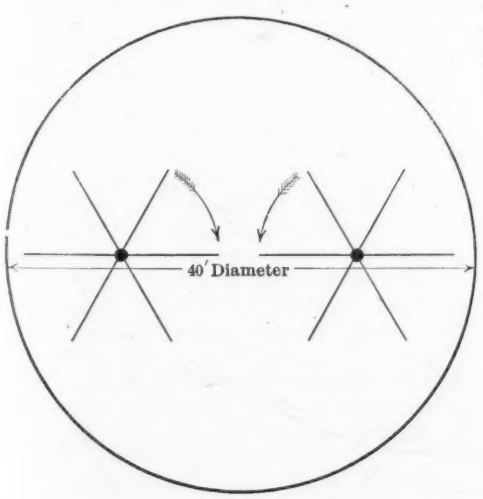


FIG. 1.—AGITATOR.

The assay of slime, both before and after treatment, requires great care. On some plants, slime-residues run as low as 7.5 grains per ton, so that 8 A. T. is taken for assaying a single sample. The assay is made by taking 4 A. T. in two J crucibles, and combining the two lead buttons. The following mixture gives excellent results: Slime, 4 parts; litharge, 10 parts; sodium carbonate, 4 parts, and borax, 4 parts. Argol is used as a reducting agent.

In the above charge the borax is *not* mixed in as is usual, but is spread on top. Clean malleable buttons are obtained. When the original slimes run as high as 2.5 dwt., duplicate assays of 2 A. T. each are made.

Before considering recent installations it will be well to note the indirect advantage of a slime-plant. Mr. John R. Williams, who has done so much in solving this problem on the Rand, sums up the indirect advantages as follows:[2]

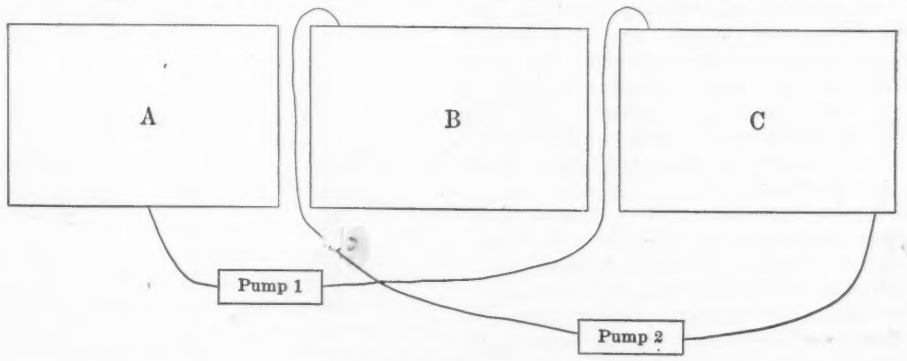


FIG. 3.—ARRANGEMENT OF PUMPS.

1. A larger proportion of gold is obtained by amalgamation.
2. Economy of time in leaching sands.
3. Storage of slimes.

[1] 'Discrepancies in Slimes Treatment,' by W. A. Caldecott. *Proceedings* Chemical & Metallurgical Society of South Africa. Vol. II., p. 372.

[2] 'Indirect Advantages of a Slimes Plant,' by J. R. Williams. *Ibid.* Vol. II., p. 657.

4. Economy in water.

A striking illustration of No. 1 happened recently. Before the erection of a slime-plant on a certain big mine the slime assayed 5 dwt. After the plant had been in operation a few months the gold content fell below 3 dwt. Rand experience proves that it is safe to expect a reduction of 1 to 2 dwt. in the slime after a plant gets into full swing. The reason of this is that the lime in solution in the mill-water, after it is returned from the settling dams, so coagulates the slime that more gold is caught on the plates by amalgamation.

A few improvements in details have been made in the decantation process. Flat-bottoms have been replaced by conical bottoms, because this construction favors discharge. With the flat-bottom vats several Kaffirs were put into them with hose to wash the slime out; they are no longer required. A light steel frame-work, supporting a large nozzle, is placed over the apex of the cone; when a vat is to be discharged the hole at the center is opened, and a stream of water pours into it from the nozzle. In this way, and with the aid of a hose, the slime makes a rapid exit.

Plants were erected at first with vats 40 ft. in diameter containing elaborate agitating gear, operated by a rope-drive from the mill-engine. With such a large diameter it was found impossible to run this agitating gear, as the bearings became red hot, belts flew off, etc. With 20-ft. vats, however, agitating gear is used successfully in a number of cases.

Agitators can be employed if another scheme is adopted. This is illustrated in Fig. 1, where it will be seen that the radial arms revolve in opposite directions. Centrifugal pumps, however, are better mixers; although it is well enough to have both agitators and pumps available. The great advantage of having agitating gear is that a vat can be used both for receiving and for treatment, otherwise the charge must be transferred to another vat by the pump before treatment commences.

At first the slimes passed through large spitzkasten before going to the vats. The lime added caused a concentration, so to speak, in the spitzkasten; the overflow water, which should be perfectly clear, went to the dam. These cumbersome and expensive spitzkasten are being omitted in the new plants, especially where 40-ft. vats are used. The slime runs direct into the vats, which have been set "dead level," so that the water can flow away at every point; the overflow being as free from slime as the overflow from the spitzkasten. If the water should show slime, more lime is added. Some cyanide men contend that it is better to have spitzkasten for mills of 200 stamps and over.

Lime is universally used to cause quick settlement of the slime. Only the lime in solution is efficacious; I believe it would pay to dissolve it in a tank, fitted with a stirrer, to be revolved by an entering flow of water. This lime-water could then be fed automatically into the slime launder.

An automatic lime-feeder is usually placed below the sand-vats, near the large spitzkasten. In one instance only is the lime fed into the tailings before they enter the vats. At this cyanide plant no lime is fed into the mill. The manager uses only a 0.2 per cent solution, whereas on neighboring mines where the lime is fed after the pulp leaves the sand-plant a 0.3 per cent cyanide solution is employed. It is cheaper to neutralize with lime than with KCy!

Great care is taken that the slime does not settle in the sand-vats. Not only does slime delay percolation, but it takes up strong solution rich in gold, and retains it, causing a rich residue. An excess of lime also causes trouble in the precipitation of gold in the zinc-boxes.

On the plant referred to, there are two lime-feeders, one before the pulp enters the sand-vats, and one before it enters the slime-vats; altogether about 0.9 lb. of lime per ton of tailings is used. Half of this is fed at the first feeder to keep down the consumption of KCy,

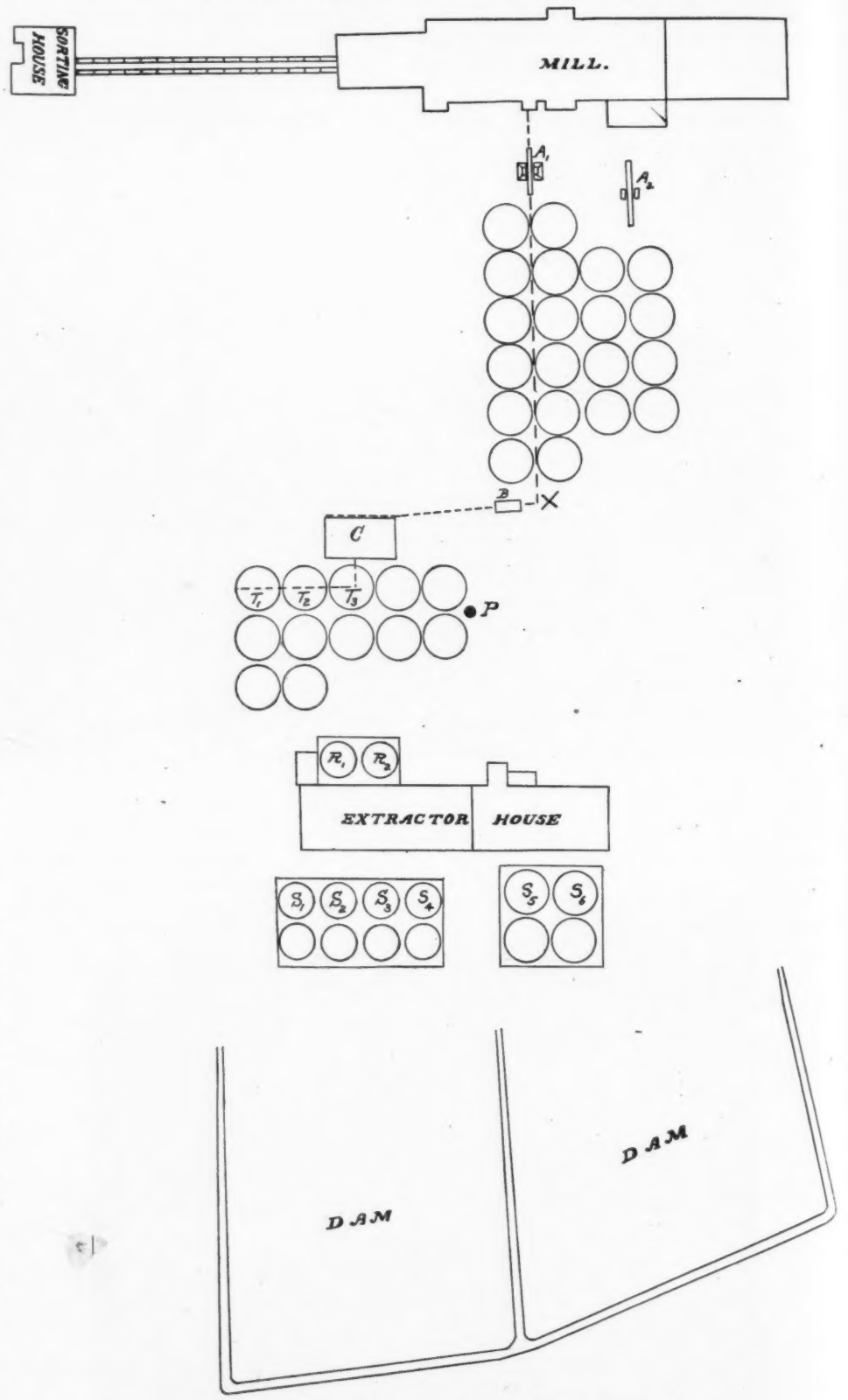


FIG. 2.—A SLIME PLANT ON THE WITWATERSRAND.

It is found that the best results are obtained both in precipitation and economy of cyanide, when the three working cyanide solutions show the following alkalinity (reckoned in caustic lime): strong, 0.045; medium, 0.035; weak, 0.025. The solutions are tested every eight hours for alkalinity.

and the other half is added at the second feeder, so as to hasten a settlement of slime.

A general plan of the reduction works of a big mine on the Rand is shown in Fig. 2. The pulp from the mill is elevated by the tailings wheels, A_1 A_2 high enough to run by gravity into the top vats. There are two rows

of these, one over the other, the upper being called 'receiving tanks,' and the lower 'treatment tanks.' The heavy dotted line shows the path of the slime from the mill to the slime-plant. The sand is treated in the vats near the wheels, while the slimes go to those at T_1 T_2 T_3, etc. There is a return spitzkasten at X, to separate out the fine sand mixed with the slime, and return it to the tailings wheel. B marks the place where the lime-feeder is usually placed. The large 'spitz' for concentrating the slime is shown at C. The overflow water runs to the dam, from whence it is pumped back to the mill. The slime is run into one of the receiving vats T_1 T_2 T_3, until a charge of 110 tons is collected; these are 40 ft. by 8 ft.; the 'treatment tanks' are 40 ft. by 12 ft. The charge is transferred from the collecting vat T to a 'treatment tank' by a centrifugal pump, shown at P.

A satisfactory method of operations is indicated by Fig. 3; by this scheme time is saved, as the circulation proceeds during the transfer from one vat to the other. The charge is received at A; it is then transferred with solution to C, at the same time pump No. 2 delivers into B. In this manner all the required circulation is obtained. Then the solution is decanted. After this the charge in B receives a second treatment with solution which has passed through the boxes, and finally the charge is ejected.[3]

The receivers for the gold solution are shown at R_1 and R_2. At the bottom of these vats there are filter-beds, so that the solution gives up any fine matter held in suspension before passing through the precipitation boxes in the extractor house. The solutions used on slime-plants vary from 0.02 per cent to 0.01 per cent.

At first the Siemens & Halske electrical precipitation process was universally used, but this method is now practically dead on the Witwatersrand, and there seems little likelihood of a resurrection. The gold is now precipitated by the zinc process.[4] No attempt is made to keep the yield from the sands and slimes separate, the gold from all boxes being run down together. The amount recovered from the slime-plant is estimated from the quantity and assay value of the solution passing through the boxes. After precipitation the solution runs into the sumps S_1 and S_2; cyanide is added to bring it up to strength again, and it is ready for use.

A question of importance is the disposal of the slime after treatment. If it is possible the dam should be built at a point considerably below the plant, so that the discharge can be effected without the use of pumps. In many cases, however, the slime has to be pumped to the dam; the walls are built up as required, to hold back the slime. The water drains off and finds its way to the dam. Loose earth makes an unsafe embankment. An excellent wall is made by using ordinary ashes from the boilers. The disposal of slime in the future will be a difficult problem for some of the mines.

It is the writer's opinion that the decantation process for the treatment of slimes has come to stay on the Witwatersrand. There will be improvements in details, but the main features are likely to remain. The process has been rather severely criticized, but a process that can treat material assaying 1.2 dwt. at a profit—a feat that has been accomplished on a large scale on the Rand—is not far wrong. On properly managed and well-designed plants the cost per ton of slime treated is now 2s., with an actual extraction of 80 per cent.

The subject of filter-press treatment of slime has been well discussed,[5] but there seems little opening for it on the Rand. One of the large mines ran a small experimental plant with filter-presses for a while on 5 dwt. slime, stuff twice as rich as the average. The method did not prove satisfactory, so that this company has erected an elaborate and up-to-date plant for treating the slime by the decantation process.

[3] 'Notes on Classification,' by Lane Carter and D. Burnett. *Ibid.* September, 1903.

[4] 'A Zinc Process for Precipitating Gold from Weak Solutions,' by T. Lane Carter. *Ibid.* Vol. II., p. 440.

[5] 'Notes on the Treatment of Slimes by Filter Presses,' by Clement Dixon. *Ibid.* June, 1902.

ATMOSPHERIC CONSUMPTION OF ZINC.

A study of the action of the atmosphere on zinc, recently read before the Chemical Society in London by G. T. Moody, is abstracted as follows, by *Science:* Strips of thin sheet zinc were exposed for five months to the action of the atmosphere, with the result that the metal became completely covered with a half-crystalline coating of a basic carbonate, of formula $ZnCO_3, 3Zn(OH)_2$. From this it appears that the corrosion is to be ascribed, not to a direct oxidation, but to the action of the atmospheric carbonic acid. A confirmation of this was found in the fact that zinc dissolved in a saturated solution of carbon dioxide, the acid carbonate of zinc being formed, and on spontaneous evaporation a precipitate of basic carbonate was formed, of the same composition as that occasioned by atmospheric corrosion. While commercial hydrogen peroxide has a very rapid action on zinc, converting it into the hydroxide, pure hydrogen peroxide, even of 30 per cent strength, is entirely without action, and the same is true regarding iron. Lead, on the other hand, is rapidly acted on by this reagent, being converted superficially into lead peroxide. Thus the action of the atmosphere on lead may be due to the presence of hydrogen peroxide, but this cannot be the case with the corrosion of zinc and iron. That zinc is less corroded in the atmosphere than iron is attributed by Mr. Moody to the fact that so much of the carbonic acid is retained by the zinc in the form of basic carbonate, while in iron the carbonic acid is set free as soon as it has done its work, and thus keeps on in its attack upon the iron.

Tellurides are compounds of tellurium, an element which got its name from the Latin *tellus,* the earth, just as selenium is derived from the Greek, *selene,* the moon. This is a curious example of scientific christening.

Sylvanite is named after the historic mining region of Transylvania, where it was first formed. Owing to the peculiar arrangement adopted by the crystals of this mineral, which is such as to resemble Arabic lettering, it is also called 'graphic tellurium.' An early analysis of sylvanite from Cripple creek, made by Dr. Richard Pearce, gave gold, 25.45; tellurium, 60.61; and silver, 13.94 per cent.

The metal osmium has been used as a substitute for carbon in the filaments of incandescent lamps, with marked success.

BESSEMER COPPER CONVERTERS.

By C. H. Glasser.

The type of converter referred to in this paper is of the trough or barrel type, which during the past few years has come into such favor in newly erected plants as almost entirely to supplant the old style of vertical converter. The reasons for the general adoption of the trough converter are not easy to explain, though it is conceded that the advantage to be gained by the gradual tilting of the shell during the blowing, so that the penetration of the air pressure through the matte may be varied, will add materially to the efficiency of the blowing operation. It is, nevertheless, true that converter men, as a rule, give little thought to the theoretical objective saving which caused the adoption of this design, it being their general practice to sink the tuyeres as far as possible into the charge and call for more air.

A greater surface for the evolution of the sulphur should, and does have some effect in lessening the time required to blow a charge to blister copper, but a serious disadvantage of this type as compared with the vertical converter is the difficulty in retaining the lining in position until it wears out by the natural process of chemical combination with the iron contained in the charge. Its shape is theoretically weak, as it forms an incomplete circular arch without proper thrust-bearings to support that arch, and the formation of the cap is such as to afford small opportunity for tamping the lining solidly into place by means of mechanical tampers or to shape it into a self-supporting form; consequently a converter must be taken from the stand often to have the cap lining renewed after the first or second blow, or it may happen that a portion of the cap lining falls out entirely during the blow, necessitating a quick transfer of the unfinished charge to the floor or to slag ladles. Granting that the same difficulties are met with in the operation of the vertical converters, it is my opinion that they occur with less frequency, that the vertical type will stand more charges per lining and that re-lining can be more quickly performed at a less cost for labor than in the horizontal or trough converter.

Notwithstanding these difficulties in the use of the horizontal converter, it must be acknowledged that there are compensating advantages, and that its universal adoption by men of undoubted experience constitutes a sufficient recommendation for its continued use.

There should be provided a sufficient number of blowing stands to accomplish the work intended, as well as a sufficient number of shells to keep the stands in constant operation, taking the matte from the furnace as fast as it is smelted, thus avoiding the waiting for dry shells, as such loss of time generally makes it necessary to cut off the blast from the furnace or to tap the matte from the furnace into beds on the floor and return it to the furnace, either method resulting in reduced output and increased charges.

The number of stands required for a given output depends on the size of the converter and the quality of the matte to be converted. Assuming that the composition of the lining is all that may be desired, that the mixing, tamping and drying operations will be done in a thorough manner so that a majority of the linings will perform their full quota of slag-making service, there should be four shells provided for each stand in operation, so as to

allow of the setting aside of shells from time to time for necessary repairs. All shells and caps should be interchangeable, each cap and shell should be provided with separate lifting rings, and both ought to be strongly re-enforced at the joints and secured to each other with heavy key-bolts and lugs at each end and in the middle. When no key-bolts are provided for the center of the shell, the converter warps along the joint, and when turned down to skim, the metal flows out of the joint, burns off the re-enforcing angles, caving the adjacent lining, and causes serious loss of time and expense for repairs. Converters are usually operated by means of a vertical rack attached to a hydraulic piston, and the stands should be placed on substantial concrete foundations with cylinder-pit of ample area and of depth sufficient to allow a space of 18 in. below the lower cylinder head. This pit should be properly drained, made impervious to the influx of water and at all times kept dry to afford access for inspection and repairs to the cylinder, piping, and hydraulic valve. The hydraulic valve should be so placed in the pit as to be easily and quickly accessible for repairs, and the operating lever with quadrant should be conveniently alongside the stand in the usual position dictated by experience as giving protection from sparks and allowing free range of vision to the tilter, both during the progress of the blow and while pouring.

While the foregoing observations relate to the type of hydraulic converter in general use, experience has developed many serious objections to this system; these objections may be overcome by the adoption of means to tilt the converter with power obtained from an electric motor.

The hydraulic converter requires a deep and dangerous pit to accommodate the cylinder, hydraulic valve and necessary piping; also an expensive double piping system, which must be readily accessible for repairs and yet be protected from freezing, it must generally be buried under the floor of the building with branches to each stand, and if damaged or broken may require a complete shut-down. Extra heavy valves and fittings must be kept in stock for the repairs, which are so frequently needed on a system sustaining the pressure and extreme shocks to which such lines are subject, and considerable attention must be given to these lines and to the operating valve if they are to be tight and in working order. Coupled with the troubles on the main lines are those occasioned by the careless attendant, who frequently pushes the piston through the upper or lower head, an accident due to the builders giving so short a travel to the rack that there is seldom more than an inch clearance in the parts at each supposed extreme position. Operators always find this pre-determined range of movement too small and name it as an excuse after pushing out a head.

In addition to the troubles at the converter end of the line, there is usually at the power-house a large high-pressure pump of sufficient capacity to supply two or three times the number of converter stands now in use; in one corner there is a large and expensive hydraulic accumulator, necessary to provide and regulate the pressure on the line, and alongside stands a large water-tank, the beginning and the end of the system. These machines will occupy approximately 150 to 175 sq. ft. of floor space, and it may be assumed that by reason of the space required, the size of the power-house has been increased at least 50 per cent more than the actual space occupied, entailing an excessive cost for the building. A special automatic valve is fitted to the steam pipe of the hydraulic pump, which, by means of suitable connections with the accumulator, starts and stops the pump at intervals determined by the consumption of water in the system, and the consequent rise and fall of the weighted portion of the accumulator. It is found that when the automatic valve is closed, there is always some leakage of steam through it, which condenses in the cylinder and necessitates that the drips must be always left open. Water also condenses in the pipe above the valve and at the instant of starting this water is blown into the cylinder, causing much hammering during the first few strokes and a large increase of steam consumption.

I have made several tests to determine the steam consumption of these pumps under regular converter service and found them very expensive to run, as may be judged by a study of the accompanying record, taken from a duplex pump and showing the intervals of idleness and the number of strokes after each interval.

No data are here given as to the size of pump or the service performed, the object of submitting the table being to emphasize my remarks concerning conditions of service. The records were taken by two men, one of whom recorded the exact time of starting, in hours, minutes and seconds, while the other counted and recorded the strokes made by one side of the pump. The writer afterwards revised the time figures to the nearest even minute intervals, so that the sum of the intervals agrees with the total time occupied by the test.

Under these conditions of service it will be seen that the steam consumption must be exceedingly wasteful and constitutes one of the most forcible arguments against the adoption of the hydraulic system.

From a careful consideration of the initial cost of installations and subsequent cost of operation of various converter plants, I am of the opinion that the electric motor when properly installed and connected to the converter in such manner as to fulfil all of the requirements of practical operation, offers sufficient advantages over the hydraulic system to justify its use in most cases where the electric current is available or where the hydraulic system is not already installed.

Having, however, no knowledge of any plant where the electric motor is at present employed for this purpose and, consequently, being unprepared to forestall such unforeseen difficulties as may develop in actual converter work, it is my intention only to bring out such objections to the continued use of the hydraulic system as have developed in actual practice and to present such supposed advantages as may accrue by substituting the electric for the hydraulic equipment.

An electric power system is a necessary part of the modern smelting plant, power being generally used for crane work, electric locomotives and motor-driven machinery throughout the works and on account of the extremely variable requirements of load due to the constant starting and stopping of cranes, locomotives, elevators and other intermittent machinery, it will be found that the generating unit operates a greater portion of the time under insufficient load for best economy, and it is prepared, therefore, at all time to carry the extra temporary load that may be imposed on it by the power required to tilt the converters. Considering the motors, controllers and gearing at each stand and the extra cost of wiring and other electrical appliances as against the cylinder and rack, hydraulic valves and piping, hydraulic pump, accumulator, supply-tank and labor cost of installation, together with increased cost for converter foundations and additional cost of power-house, my estimate of the initial cost of installation is considerably in favor of the electric system, and the greater economy in transmission of power, repairs and attendance during operations should have considerable effect in decreasing the yearly cost of coal consumption, power-house attendance and other items chargeable to converter expense. The design of the electrically equipped stand should be such that the motor and necessary gearing for the reduction of speed will be protected as far as possible from the splash of molten material from the converter, that the motor is accessible and equipped with proper controlling devices, that the space occupied does not encroach upon that required for the punching of tuyeres and the handling of poured pigs or mould cars, and that in case of any injury to the motor or cutting off of current, the blowing, skimming, and pouring of the charge on the stand may be brought to a finish without serious inconvenience or delay in transferring the charge to another converter stand. To fulfil the last-named condition necessitates only that the motor-shaft or other auxiliary shaft be extended for the application of a hand-crank, which may be applied and used in such an

Minutes interval of idleness.	Strokes one side.	Minutes interval of idleness.	Strokes one side	Minutes interval of idleness.	Strokes one side.
3	13	4	12	6	10
4	12	4	12	13	21
2	14	4	13	4	6
1	87	5	13	7	11
4	14	4	13	5	13
6	18	6	11	6	12
2	13	6	13	6	8
4	12	7	12	3	9
7	12	4	13	7	12
4	13	2	13	8	11
3	19	5	10	13	13
4	13	3	9	22	14
3	10	5	11	3	12
2	14	5	15	4	13
1	16	1	11	3	12
1	17	6	13	5	12
1	32	3	14	3	12
3	13	7	31	4	12
2	27	3	14	3	13
5	13	3	33	5	15
11	13	1	10	5	14
4	13	2	62	3	12
4	14	1	10	2	11
7	12	2	11	4	14
2	15	11	13	340	1132

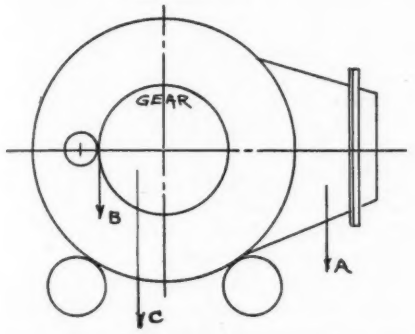
Total time, 340 minutes. Total strokes one side, 1,132. Average strokes per minute, 3⅓.

emergency. It is a small feature not liable to be used except in occasional instances, but at times it may obviate an unexpected difficulty.

The rotative speed of the moving converter, when being tilted, is approximately at the rate of one revolution per minute, and this will not be out of the way for any size converter, a slower speed not being desirable, and a faster speed being liable to give too great a movement during the pouring operation.

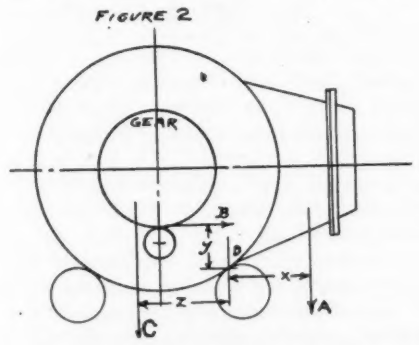
The problem presented by the conditions of great reduction in rotative speed between the motor and converter and the necessity for so arranging the mechanism that the converter may be easily and quickly attached or detached from the stand is best met by the use of a system of spur-and-worm gears ending in a

FIGURE 1



strong pinion, the teeth of which mesh with those of gear riveted to the converter shell. In my opinion there is but one position on the circumference of the converter gear to which this pinion can be successfully applied to operate horizontal converters as usually built, and in no other position can the conditions of service be fulfilled without material alterations of the supporting rollers. This position is at the exact point at which the vertical rack would mesh with the gear, or on the horizontal line drawn through the center of converter gear, and on the side towards the tuyeres. In other words the center line of pinion-shaft

FIGURE 2



must be at the same height as the center line of converter. A very much neater and cheaper design could be made by placing the pinion on the vertical line through the gear, allowing the shell-gear to drop into vertical mesh with it, and this is probably the place that would immediately suggest itself to a designer who had previously neglected to calculate the statical moments of the forces involved, or who was not sufficiently experienced in the practical operation to have had certain apparently erratic performances of these machines brought to his notice and impressed upon his memory.

To illustrate for a general case without reference to the magnitude of the forces involved, the following graphical demonstration is given for both positions of the pinion, showing the relative directions of the forces applied, and their effect in producing a stable or unstable equilibrium. Fig. 1 shows without demonstration that all the forces involved are opposing and parallel, that the force exerted by the pinion is in the best position to oppose that due to the overhanging nose and that stable equilibrium can be maintained in all positions desired. In Fig. 2 the gravity force A, tending to produce rotation of the converter about its center, is opposed by the force B, exerted by the pinion, but it will be noted that both forces act in a direction tending to produce a clock-wise rotation of the converter about the front-supporting rollers D, and that such movement is only opposed by the gravity force C, due to the weight of that portion of converter to the left of D. Now, letting x y and z be the respective lever arms about D of the forces A, B and C, and taking the moment of forces about that point we must have for exact equilibrium the equation $Ax + By - Cz = 0$, and by transposition $Ax + By = Cz$. The force A in these equations is the weight of that portion of converter to the right of D. If Cz is equal to or greater than $Ax + By$, there can be no rotation about the point D, but if Cz is less than $Ax + By$, rotation must take place and the converter will be lifted from the rear rollers, spreading the gear centers until the teeth are unmeshed, the result being at least a loss of the charge in hand.

This latter condition is easily reached when the lining is worn thin and the nose is filled with metal accretion, as occurs after several charges have been blown, and indeed it will happen in the converter under normal conditions unless the supporting rollers are spread a much greater distance apart than in the usual construction.

A practical demonstration of this same case was brought to my knowledge several years ago in the instance of an installation of horizontal converters designed with hydraulic-operated horizontal rack, placed so as to mesh with the bottom converter gear. These converters were condemned and thrown out immediately after installation, because of the unmeshing of the teeth when attempting to tilt the converter either to charge or to skim.

With a view to ascertaining the actual pressure exerted on the teeth of the hydraulic rack, as a basis for calculating the horse-power required to tilt a converter, tests were made on a converter 7 ft. diam. 10 ft. 6 in. long, having an attached end gear 40 in. diam. and a hydraulic cylinder 18 in. diam., working under an accumulator pressure of 230 lb. per sq. in. Gauges were attached to each end of the hydraulic cylinder and readings were taken while the converter was being tilted, but the results were not entirely satisfactory for the plotting of accurate pressure-curves covering the whole operation, on account of the violent fluctuations at the instant of admission and cut-off, caused by the momentum of the water in the system. Sufficiently reliable data were obtained to determine that the greater portion of the energy supplied is absorbed in forcing the water on the low-pressure side of the piston out through the valves and return pipes, and that the mean effective pressure on the piston in the case observed was 25 to 35 per cent of the normal pressure due to the accumulator, the variation depending on the angular position of the nose.

The average net pressure per sq. in. on the 18-in. piston when moving the converter from a horizontal to a vertical position was approximately 70 lb. per sq. in., moving the piston at a speed of about 10 ft. per min., from which it was calculated that 5.4 h. p. was transmitted by the rack-teeth, which, allowing 25 per cent extra for starting the load and an additional 40 per cent for loss of power in the transmission gearing, gives a total of about 9.5 h. p., or, say, a 10-h. p. motor.

It may be argued that there is no necessity for providing a motor of sufficient nominal rating to cover the starting load, as it is well known that motors supplied by prominent makers will safely carry a momentary overload 50 per cent in excess of their rated capacity, but it will be found that the frequency with which such overload is applied will eventually develop a short circuit or other weakness in the motor which would not happen in the case of the larger one.

With a direct current of 220 or 500 volts available, the motor best suited for this work is the enclosed series type, operated by a controller placed at the side of the stand, or in such position as may be deemed most convenient. It is important that the controller shall be of the reversible type, operated with lever in preference to crank, and of such construction that the lever meets with a certain amount of resistance at the center of cut-off point, which will prevent throwing it too far over and reversing the motor when attempting to cut off the current quickly. It is also necessary that the armature shaft be equipped with a magnetic brake to overcome the momentum of the armature as soon as the current is cut off, thus permitting of accurate spotting of the converter in any position.

As previously stated, I have no knowledge of any instance where the electrically equipped converter is in use, and the suggestions above outlined are those resulting from experience gained in installing and operating hydraulic converters, and utilized by me in recent designs for an electrical plant. Two or more electrically-tilted converter-plants now being installed by responsible parties will be in operation before the end of the year, and it is expected that their mechanical advantages, combined with the increased economy shown in the cost of installation and operation, will result in their general adoption elsewhere.

ZINC CEMENT FOR PIPE JOINTS.—Bonneville & Company state (French patents 332,788, June 4, 1903, and 336,671, July 8, 1903) that metallic zinc in the finely divided form deposited in the chambers in which zinc white is collected can be mixed with a drying oil into a paste, which remains soft if kept in closed vessels, hardens when exposed to heat, and is useful as a cement for the joints of steam pipes, etc. A siccative is necessary with linseed oil and most of the other drying oils, but wood-oil gives sufficient hardness when used alone. Tow or hair, and also a proportion of whiting, may be added to increase the plasticity of the paste. The paste may be moulded, cast or stamped in any form, and on exposure to temperature of 100° to 200° C. becomes extremely hard, when it can be turned, sawed or carved, and is capable of taking a high polish.

It has been found that a better quality of coke is obtained and the process facilitated if the coal is crushed before charging into the ovens.

ORIGINAL NATIVE GOLD IN IGNEOUS ROCKS.

BY WALTER HARVEY WEED.

The presence of free gold and gold-bearing pyrite in the mass of an eruptive rock, and entirely apart from mineral veins or an ordinary mineral deposit, is of more than ordinary practical and scientific interest because a study of such masses furnishes not only a guide in prospecting for detrital gold deposits, but has a most important bearing upon the formation of mineral veins. For very many years there has been an almost universal belief among mining engineers, and to some extent among geologists, that deposits of the precious metals are in some way genetically associated with igneous rocks. As stated by von Humboldt, "The deposits of the precious metals and of lead, zinc and mercury are usually associated with intrusions of igneous rocks." There is, however, a great diversity of opinion as to how the part is played. The direct igneous origin of certain ores separated out of still fluid basic igneous rock is maintained by Vogt. Howitt in 1887 and Spurr in 1897 urged the igneous or aqueo-igneous origin of many quartz veins, the latter being the first to apply these to gold-quartz veins, which Howitt expressly excludes. J. E. Spurr asserts his positive belief that certain gold-quartz veins are practically but an extreme form of a series of granite rocks, produced by a kind of magmatic differentiation or segregation, the less extreme phase, intermediate between the quartz-feldspar rocks (alaskites) including most pegmatites and many aplites. Between these views that ores are ultra-basic or ultra-acid segregations there are all gradations of belief. The latest paper[1] upon the subject by Spurr is noteworthy in its discrimination of mineral provinces as compared with petrographic provinces and in the elaboration of the facts supporting his theory that many gold-quartz veins are the silicious end products of the differentiation of molten igneous magmas. Without discussing the interesting observations given in this paper, which is a radical advance on the theories advanced by Howitt,[2] Crosby and others[3] regarding the pegmatite and quartz veins, I desire to bring to the reader's attention several significant occurrences of gold in igneous rocks.

As a primary constituent of eruptive rocks gold has been reported by many reliable observers, the result of field studies being confirmed by petrographic investigation. An interesting example mentioned by Beck in his text-book, but which appears to have escaped the eye of most other writers, occurs in British Guiana, at the Omai placer mine on the Essequibo river. According to Lungwitz[4], the gold is derived from aplite. The gold occurs both in fine dust and coarse nuggets and is accompanied by quartz.

This aplite has been tested to a depth of 800 feet by diamond drilling. Thin sections show it to be a Plagioclase aplite (quartz and feldspar) showing impregnation with pyrite, sericite, epidote and zoisite and carbonates. This rock carries $1 to $15 per ton in gold, as determined by Harrison, who says "the presence of carbonates of iron, lime and manganese as well as pyrite strongly point to the metal *not* being an original constituent of the rock," but (in part) derived from the degradation the overlying diabase vein, (in part) brought into it by percolating waters.

In the Altar district of Sonora the remarkably rich dry placers of the region, worked for two centuries, are, according to Aguilera, residual debris, that is, 'wash' deposits of a band of aplite cutting through the crystalline schists which form the hill proper.

These and other better known occurrences all deal with highly silicious rocks from Mexico, Chile, Arizona, Bolivia and the Urals, but except in the Sonoran instance described by Merrill, there appears to be some ground to doubt the primary nature of the gold, for the reason that the rocks are not absolutely fresh and unaltered. On the other hand, the presence of free gold in amphibolized diabases, etc., is not necessarily primary, for although often referred to as such, the microscopic investigation of the rocks invariably shows them to have suffered ordinary hydro-metamorphism (meaning the ordinary alteration of rocks due to moisture). A remarkable case of auriferous basalt at Richmond river, New Zealand, assaying as high as 15 grams per ton, may be due to a local gathering of sands by the basalt.

So far as known to the writer the Mashonaland diorite recently noted by Spurr[5] in his description of a slide of the rock, is the only case where a solid rock mass is rich enough to be mined as ore. Numerous instances are known, however, where the gold contents concentrated by weathering processes in the residual detritus covering the solid rock furnished 'pay gravel' for placer mining. The most widespread, but possibly least known, example of this exists in Surinam (British Guiana).

According to the accounts of several geologists who have examined the alluvial deposits of that region, most of the placers could only have received their gold from the gold-bearing diabases.

This association of placer gold with diabase rocks is summarized by J. B. Harrison, Government Geologist of British Guiana, as follows: "We have satisfied ourselves that the source of the gold in these districts is, as a general rule, the intrusive diabase or the schists resulting from the metamorphism of diabase dikes. The gold occurs through the ocherous clay and the ironstone produced by the degradation of the diabase, epidiorite and hornblende-schist, and is collected locally in gravels found in ravines and valleys cut in these rocks." Statements such as these concerning the gold contents of the diabase are based upon a large number of assays of rocks gathered at over one hundred widely separated localities throughout the country. They are summed up as follows: "The evidence which we have obtained tends to show that the intrusive diabase is directly and indirectly the principal source of the gold. The rock appears always to contain gold in minute quantities, and it is concentrated and associated with pyrite near the contacts especially with earlier igneous rocks, and is absent along sandstone contacts."

It appears altogether probable that as in the case of the platinum found sparsely disseminated through the basic rocks of the Urals, that prolonged weathering and degradation, that is, a long and great concentration of material, are necessary to produce workable deposits. Hence more importance is attached to Harrison's statement that gold appears "but rarely in quantity except in places where the diabase has undergone very great weathering and degradation" than to the correlative association with the older acidic rocks (quartz porphyrites).

As diabasic rocks are subject to rapid subaerial decay, especially in wet tropical regions, red 'laterite' clays are formed with veinlets of secondary quartz and deposits of ironstone. This 'laterite,' known by various names in different countries, *Roche à ravet, cascajo* (Venezuela) and *itabirite* (Brazil), consists not only of beds of concretionary or of shelly ironstone, but of ferruginous sandstone. The following analyses represent the different steps in the alteration of the rocks and the formation of the ironstone deposits.

Ia. Diabase, coarse dike rock. Potaro river. Average.

Ib. Diabase, coarse textured rock from dikes in sandstone. Potaro river.

II. Altered Diabase (proterobase and epidiorite) more pyrite than I.

Contact epidiorite contained as much as 5 oz. gold per ton.

III. Laterite. Deep red and chocolate colored clays; final products are clay, quartz, ironstone and residual ilmenite.

IV. Concretionary ironstone.

	Ia.	Ib.	II.	III.	IV.
SiO_2	52.00	52.62	51.28	51.76	9.86
TiO_2	.53	.46	.38	.67	.89
P_2O_5	.008	.005	.007	trace	trace
Al_2O_3	21.61	21.77	23.25	24.55	9.15
FeO	3.01	2.13	2.53	....	....
Fe_2O_3	4.06	1.58	4.02	11.34	66.41
FeS_2	.005	.002	.003	....	....
Cu_2S	trace	trace	trace	....	....
MnO	.05	trace	.06	trace	none
CaO	8.80	10.19	9.97	0.23	0.11
MgO	6.53	5.68	5.82	0.21	0.32
K_2O	.18	.25	.33	.21	....
Na_2O	2.81	2.39	2.22	.14	....
H_2O	.35	.80	.40	11.18	....
CO_2	.06	.04	.05	....	....
Total	100.003	99.917	100.32	100.29	

Large bulk samples of diabase from the Essequibo, Potaro and Demarara rivers were assayed in the government laboratory and yielded 5, 17 and 26 grains of gold and 3 to 4 grains of silver, per ton.

The altered quartz diabase containing quartz, carbonates and secondary pyrite, yielded 51 grains of gold per ton.

According to Du Bois[6], but one-tenth of the placer area is the result of vein degradation. This close association of placers and diabase is further shown by the fact that the residual products of the weathering of the rocks contain enough gold to pay for working, and that the higher gravels on the slopes of diabase mountains contain less gold than those farther down. At the Victoria placer the detritus of slightly decomposed diabase yielded from 0.2 to 0.6 grams of gold per ton, while the decomposed rock *in situ* averaged 0.3 grams gold per ton. The gold is usually in minute dust-like grains, nuggets being quite rare. Du Bois says: "I have found in various fresh diabases both free gold and gold-bearing pyrite diabases whose primary nature cannot be doubted when studied in thin sections."

In French Guiana similar rocks also contain gold and furnish placer 'dirt' and where pay

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[1]This JOURNAL. July 11, 1903; also Trans. A. I. M. E. Vol. xxxiii.

[2]'Intrusive Rocks at Dargo, Victoria.' Royal Society of Victoria, Melbourne, Jan. 17, 1887.

[3]Crosby, Boston Society of Natural History. Finlay, Report State Geologist, Vermont, p. 49.

[4]'Ueber die regional Verwanderungen der Goldlagerstätten.' Diss. Rostock, Leipsig, 1899. Also 'Goldseifen Britische Guiana' *Zeitschrift Praktische Geologie*, 1900, p. 213.

[5]This JOURNAL, Oct. 3, 1903. See also issue of Feb. 4, 1904.

[6]Tschermaks' 'Mineralogie u. Petrographic Mittheilungen,' Vol. XXII, p. 39.

gravels occur it is usually along streams whose branches drain a tract of diabase or diabase rocks. The gold in these rocks is regarded as primary by Levat, who says the gold occurs either free (as proved in perfectly fresh undecomposed material), or as gold-bearing pyrite. According to Levat (quoted by Beck) the diorites contain 0.5; 1.4; 41; and 5.2 per cent of pyrite, with 24; 0.24; 1.5; 2 grams gold per ton, and 0.4; 0.02; 2; 6 grams silver per metric ton. The French Guiana diabasic and dioritic rocks have yielded in their decay deposits of limonite which cover the slopes of both hill and valley, and contain from 0 to 18.5 grams of gold per ton, with 16 to 20 grams of silver per ton. A typical analysis of this rock is as follows: Fe_2O_3 59.40p; Al_2O_3 14.8; SiO_2 9.50; CaO 6.80; P_2O_5 0.02; MgO 5.40; H_2O 9.10. This shows its derivation.

The significance of these observations to the prospectors in such countries is apparent. To the student of ore deposits the evidence may be quoted for and against either the theoretical conclusions of the descensionist group or the more commonly accepted beliefs of the practicing engineer and most mining geologists.

OIL IN PERSIA.—It is reported that a large flowing well has been opened near Gatil-Sherin, on the Turko-Persian frontier. An English company has been operating in the field for some time under a special grant from the Persian government.

THE HYGIENIC STATUS OF COAL MINING.—The popular notion that mining is an unhealthy occupation seems to be an inheritance of a former age, before the industry attained modern development. At least it has no general basis in fact to-day, as has been established by repeated investigations of official and authoritative character.

The latest governmental inquiry on the subject has been undertaken by a French parliamentary commission which has just completed a report dealing with the social status of the coal-mining communities in that country. The report of the commission, as summarized in the *Moniteur Industriel,* January 16, 1904, shows that the French coal miners are not only less subject to disease, but they possess better physical and mental development than those engaged in agricultural and manufacturing occupations. In the mining districts of Pas-de-Calais, for example, only 7.77 per cent of the male population is exempt from military duty by reason of infirmity; while 9.72 per cent is exempt in the manufacturing districts and 10.75 per cent in the agricultural districts. The average of military conscripts subject to phthisis and general debility is 0.75 per cent for the mining population, as compared with 1.60 per cent for the agricultural and 1.81 for the manufacturing classes. Similarly the average of those afflicted with imbecility and arrested development is 1.78 per cent among miners, 2.6 per cent among agriculturists and 2.9 per cent among laborers in the manufacturing industry.

*'Report on the Geology of the Essequibo, Potaro, Konawaruk and Demarara Rivers' by J. B. Harrison and H. I. Perkins, Georgetown, British Guiana, 1900. With photographic studies, illustrations of thin sections and chemical analyses.

A NOTE ON MINERAL CONTAINING RADIUM IN THE PROVINCE OF QUEBEC.*

By J. Obalski.

Since the new element, radium, has been discovered, much attention has been called to the minerals containing it. So far, it appears that it has only been found in uranium ores.

In the Laurentian formations of Quebec, uraninite, composed of uranium oxide and other rare earths, has been met with in the pegmatite dikes which have been exploited as producers of white mica. We have the record only from the Villeneuve mine, in Ottawa county, where uraninite and monazite have been found, and from the Maisonneuve mine, in Berthier county, where samarskite occurs. Although there are several other white mica mines and prospects in the Saguenay district, no other discoveries have been reported.

About 10 years ago I found a remarkable specimen in a white mica mine then operated by the Canadian Mica Company; this is a specimen which I identified as cleveite, and which is shown in the accompanying photo-

FIG. 1.—CLEVEITE FROM QUEBEC.

graph No. 1. This specimen has a specific gravity of 8.43, and weighs 375 grams, or about 12 oz. It is well crystallized, in dodecahedron form, thus deriving from an isometric system. No complete analysis has yet been made, but it has been ascertained to carry 70.71 per cent uranium oxide. Since the discovery of radium, and the establishment of the fact that it exists chiefly in connection with uranium ore, I have experimented with this crystal. I found that it affected photograph plates strongly, as shown by the accompanying radiographs, Fig. 2 and 3. Both of these were taken exclusively by the radio-active rays without the assistance of light. No. 3 was taken through a piece of cedar wood about ⅛ in. thick. The specimen had also a well-marked action on the electroscope. I then came to the conclusion that it contained radium, and in order to have my opinion confirmed, I showed it to Professor Rutherford, of McGill University. He stated that its radio-activity was equal to four or five, and that it contained one-tenth of a milligram of radium. This makes it comparable with the best pitch-blende so far tested for the production of radium. It is possible, of course, that this crystal may be an accidental one, but I have found other small specimens of the same mineral in this vein.

I also found in the same dike a carbonaceous material, burning quite easily and leaving a large proportion of ash containing uranium oxide. I am not able to state what is the

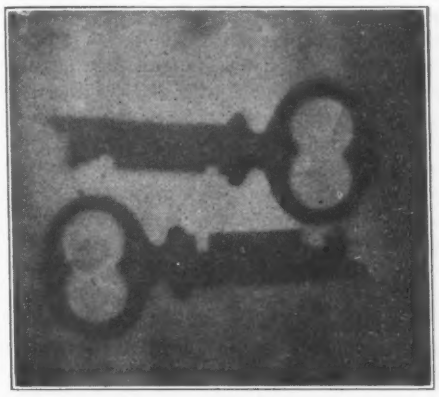


FIG. 2.—RADIOGRAPH.

relation between the two specimens, but I think the fact important and I propose to make further investigation next summer.

The white mica vein from which these specimens were taken is situated near Lake Pied-des-Monts, which is about 18 miles back from Murray Bay, in the county of Charlevoix, on the north shore of the St. Lawrence.

Specimens of the carbonaceous material above mentioned were tested by Mr. M. L. Hersey, of Montreal, with the following results: This sample has a fibrous, irregular structure and contains a small amount of mica; it proved to be a non-coking bituminous coal, yielding considerable gas, which burned with a bright yellow flame. The volatile matter (including volatile combustible matter and a small quantity of moisture) was 40.185 per cent; fixed carbon, 52.59 per cent; ash, 7.225 per cent; total, 100 per cent.

The ash itself was analyzed and found to contain 2.5 per cent of uranium, based on the coal, which is equal to 35.43 per cent of uranium in the ash itself. It is important to note that the color of the ash was olive green, being due to the presence of uranium oxide.

In another test the coal was not burned, but

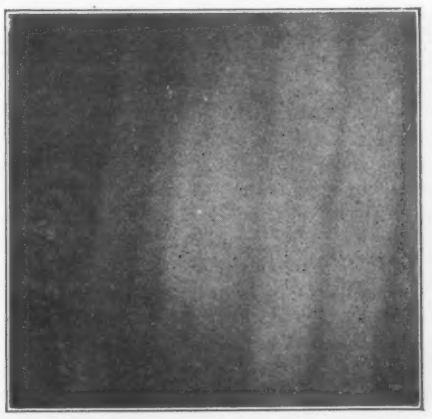


FIG. 3.—RADIOGRAPH THROUGH WOOD.

was finely pulverized, and the powdered coal treated with boiling nitric acid to dissolve the uranium compounds. It is interesting to note that the uranium may be extracted by the direct treatment of the coal with nitric acid.

*Abstract of paper presented before the Canadian Mining Institute at Toronto, March, 1904, by J. Obalski, Inspector of Mines of Quebec.

THE GYPSUM PLASTER INDUSTRY OF KANSAS.

By W. R. CRANE.

The present status of the gypsum plaster industry of Kansas is about the same, especially from the standpoint of output, as for the past few years. The opening up of new mills and the resumption of operations in idle mills have about offset the shutting down of others.

A few new mills, modern in every respect, have recently begun operations, the largest and best equipped of which is the Electric Plaster Company's plant situated at Blue Rapids, in Marshall county. This plant is especially interesting in that the motive power for all of the machinery is electricity, which is generated by water power at a point about 1.5 miles from the plant.

The method of handling the gypsum and finished product in this mill is similar to that employed in the other plaster mills; a description of the mill and process of manufacture may then be taken as typical of the practice in the construction of mills and the manufacture of plaster in the State. The method of mining may also be taken as typical.

Method of Mining.—The gypsum deposits of this locality are, as a rule, of considerable size and fairly uniform throughout their extent; occasionally, however, very irregular deposits, both horizontally and vertically, are encountered. A mine opened in and working a deposit under the latter conditions is not considered of much value, as large quantities of raw material must be available and easily accessible with little or no dead work, to make exploitation profitable.

As a rule, there is little or no system employed in laying out the workings. Main lines of haulage are run as continuations of the surface drifts, other openings being run parallel with them on further development, or run from the foot of a shaft sunk to the workable deposit. On one, or both, sides of the haulageways rooms are driven, which often run together, thus leaving odd and very irregularly shaped pillars. Long working faces are often formed, which must be again broken by passages forming pillars for the support of the roof. Usually, however, single rooms, more or less irregular in shape, are opened up and worked until the handling of the product becomes inconvenient, when new and more advantageously placed openings are begun.

The mine in question was opened by an adit, which, beginning on a fairly steep hillside, at a point on a level with the second floor of the mill, extends into the hill for a distance of about 1,000 ft. No special attempt was made to align the adit, consequently considerable useless work was done. For the first 400 ft. the adit runs approximately north; the next 300 ft. show a marked variation from the north and south line. An attempt was then made to rectify the deviation by driving a right-angled offset 25 ft. in length; the remaining 300 ft. was driven approximately parallel with the first 400 ft.

Unfortunately, the adit was driven so nearly level as to render drainage very difficult, and much water stands in depressions on the limestone floor.

The adit is lined with rough-hewn oak, walnut and red elm timber, except the last 300 ft., which has round timbers of similar material. Three-quarter sets—that is, sets with posts and caps only—are employed. The posts and caps are 6 ft. 2 in. and 6 ft. 4 in. long, respectively, both being 8 by 8 in. in section. They are spaced 36 in. The posts stand on a limestone stratum 2 ft. in thickness, and therefore require no sills. The sets for the first 700 ft. are lagged with 2 by 12-in. oak plank; the remaining 300 ft. has plank lagging on the caps and pole lagging on the posts. A single track of 36-in. gauge is laid in the middle of the tunnel for the mine cars, which are drawn by mule power. The cars have a capacity of from 800 to 1,000 lb. gypsum.

The gypsum mined is 8.5 ft. thick and is won by shooting it from the face or sides of the rooms, holes being bored by hand-operated post-augers, Hardscog make. The holes are 1.5 in. in diameter and range from 3 to 6 ft. deep. Black powder of C grade is usually employed, the charge ranging from 6 to 14 in. per hole. Squibs are employed in firing the charges. The cost of explosive per ton of gypsum extracted is about four cents.

A 4 by 6-ft. air-shaft connects the end of the adit with the surface, 96 ft. above. A prospect bore 7 in. in diam. was put down, not far from the present site of the air-shaft, before it or the tunnel were begun.

The occurrence of the gypsum with its associated strata is shown in the following section:

12	ft.	shale	12	ft.
16	"	sand stone	28	"
2	"	gypsum	30	"
14	"	shale (blue)	44	"
1	"	shale (red)	45	"
8.5	"	gypsum	53.5	"
1	"	shale	54.5	"
2	"	limestone	56.5	"

Not much prospecting or development work has been done so far, consequently little is known definitely regarding the size of the deposit.

Description of Mill.—The mill is a three-story structure, standing with the longer dimensions north and south; the north end is built into the hillside up to the level of the second story, Fig. 2. By a small amount of excavating and filling the adit track is prolonged into the mill on the second floor. A ground plan of the building, showing the position of rooms and the distribution of the various machines, is shown in Fig. 3.

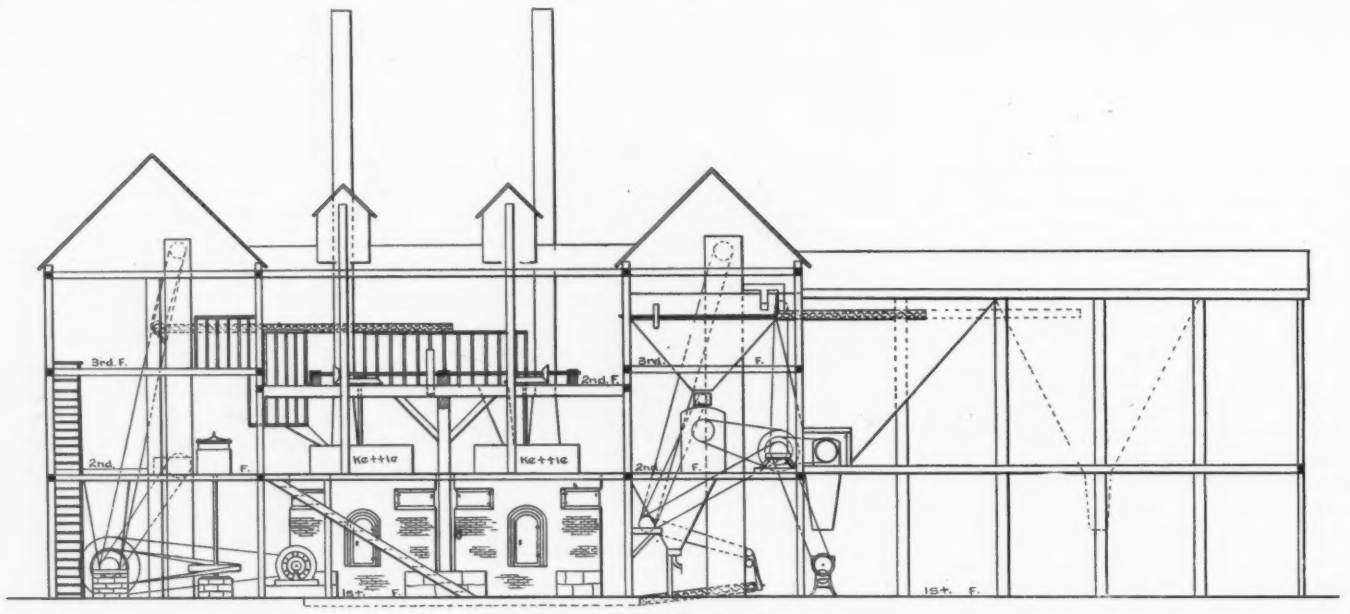


FIG. 2.—ELEVATION OF MILL.

In the extreme north end of the mill (ground floor) is the room A, Fig. 3, which is 22 ft. wide by 36 ft. long, and in which are the main power-shaft for the reduction department above, supported in bearings mounted on massive masonry pillars; the boots of two elevators (the pebble and flour), which are 12 by 36 in. in section and 36 ft. high, and the foundations of four buhr-mills, which are about 4 ft. square and 4 ft. high. A 7 by 7-ft. motor room, B^1, Fig. 3, contains the 75-h. p. motor for driving the power-shaft mentioned above. This motor runs at a speed of 185 revolutions per minute. The remaining space (12 by 22 feet) between the room A and the west side of the building, is used as a coal storage room, C, Fig. 3.

Occupying the central portion of the middle room of the main part of the building are the two calcining kettles, D, Fig. 3. This room is 39 ft. wide by 48 ft. long, the longer dimension extending transversely with the building. The kettles are described below. The furnace portions have a foundation of stone and brick and are circular in form.

They are 16 ft. in diameter, the walls being about 18 in. thick, and are wholly of brick above the stone foundation, which is built up above the ground some 2 ft. The brick-work is 14 ft. high. Set into the tops and enclosed by the brick construction are the sheet iron pans, or kettles, which are covered over and provided with steam pipes and feed openings. On the sides facing the west or front side of the building are the furnace doors, while on the opposite side is the hot-pit, into which the calcined gypsum is discharged from the kettles and where it is partially cooled while being drawn therefrom by screw-conveyors and transferred to other parts of the building.

The hot-pit is divided into hopper-shaped compartments by transverse partitions, at the bottoms of which are screw-conveyors driven by a train of bevel gears, which receive their power from a long drive shaft extending the whole length of the front of the pit. The hot-pit is 31 ft. long by 5 ft. high by 6 ft. wide—the sides of the hopper-shaped compartments have a slope of 45°. The screw-conveyors of the hot-pit are 6 in. wide and 6 ft. long and are driven at a speed of about 32 rev. per minute. Extending along the whole length of the hot-pit, on the side opposite the kettles, and placed low enough to receive the discharge from the pit conveyors, is a long launder, in which operates a 12-in. screw-conveyor which is also driven at 32 revolutions by belt from a power shaft placed in the room to the south; it discharges into a sump, which is also in the adjoining room. Three large oak posts support the floor above.

Adjoining the kettle room on the south is the sacking room, E, Fig. 3, which is 18 ft. wide by 36 ft. long. Opening into this room on the west is the motor and transformer room, F, Fig 3, which is 10 by 18 ft. In the sacking room are a screw conveyer 12 ft. long and 12 in. wide, extending along the east wall of this room; this receives its charge from the sump of the conveyer leading from the hot-pit and discharges into the boot of an endless belt elevator, which is 4 ft. 6 in. by 12 in. in plan and 36 ft. high; a sacking bin, hopper-shaped, 9 by 9 ft and 12 by 12 in. at the top and bottom, respectively, and provided with a spout for controlling the discharge; and a line-shaft situated directly back of the sacking bin and running parallel with the wall, which drives the machinery.

In the motor and transformer room are installed two motors, 30 and 40 h. p., respectively, and three transformers, which transform the 2,300 volts required for transmission to 230 for use in the mill.

The last room on the south is the main storage and mixing room, G, Fig. 3. In this room is a large bin (hopper-shaped) for storing the calcined gypsum, which is to be mixed with hair and retarder. Directly beneath it is the mixer, driven by the line-shaft operating in the room to the north. Almost directly above the mixer is the hair picker, which is installed in a small room, D, Fig. 4, and is driven by the same power shaft as the mixer. The remaining space in the room G is used for storing the products of the mill, supplies, etc.

Beginning with the first room (A, Fig. 4) on the north, second floor, is the reduction department, into which the loaded cars run direct from the adit and discharge their loads onto the crusher platform, upon which stands a jaw crusher, called a 'nipper,' jaw dimensions 2 by 12 in., and made by Butterworth & Low, Grand Rapids, Mich. Four buhr-mills, also made by Butterworth & Low, stand a few feet distant from and extend along the south wall of the room. The two elevators (pebble and flour) pass upward through this room.

The floor of the second story to the south stands some 24 ft. above the ground floor and about 6 ft. above the tops of the kettles, D, Fig. 4 and 5. Here is installed the driving mechanism for the kettles, which consists of 3-ft. horizontally-placed bevel gears (one to each kettle) mounted upon vertical shafts, and engaging with small 8-in. bevel pinions mounted upon the drive shaft. The vertical shafts operate the agitators or stirrers within the kettles.

Two long rectangular bins stand above and slightly to one side of the kettles. They are the storage bins for flour gypsum, which is subsequently fed to the kettles. One of the bins is 7 ft. wide by 6 ft. deep by 20 ft. long, and extends along the north wall of the room; the other is 8 ft. wide by 6 ft. deep by 16 ft. long, and stands above and to the rear of the kettles. Smoke stacks and steam pipes extend upward from the kettles through this floor to and through the roof above. The steam pipes are surrounded by ventilators, while the smoke stacks continue upward, standing some 60 ft. above the ground.

Next in order on the main second floor of the mill to the south is the re-grinding room, C, Fig. 4. The re-grinding mill is a buhr-mill made by Butterworth & Low. It is fed by an endless screw feed and driven by a line shaft which extends along the south wall of the room. Directly to the south of this room, C, Fig. 4, but on the same level, is a small room, D, Fig. 4, in which is installed the hair picker. The body of the long, hopper-shaped mixer bin stands to the south of room C, Fig. 4.

On the third floor, at the north end of the building, is a room, A, Fig. 5, which contains the discharge spouts of the pebble and flour elevators and the pebble bin. The pebble bin is built against the south wall of the room and is 6 ft. wide by 6 ft. deep by 24 ft. long. It stands to the south and a little above the northernmost kettle feed-bin. A screw-conveyor receives the discharge from the flour elevator and delivers it to the kettle feed-bins. It is driven by a train of bevel gears which are actuated by a pulley belted to a pulley on the elevator drive-shaft above.

The only other portion of the building that has a third floor is that occupying a corresponding position, but on the opposite side of the kettle room, where there is a room, B, Fig. 5, which contains a hopper-shaped bin for holding calcined gypsum for the re-grinding mill below in room C, Fig. 4. The bin is 16 by 16 ft. and 14 by 14 in. top and bottom dimensions. Joining this bin on the south and extending 6 ft. further to the west is the top of the mixer bin, which is 22 by 24 ft. top dimensions.

The discharge end of the calcined gypsum elevator also terminates in this room. One of the discharge spouts from this elevator leads to the bin feeding the re-grinding mill; the other terminates in a screw-conveyer, which is driven by a belt from the line-shaft below. This conveyer discharges into a second conveyor running at right angles with the first and driven by the power shaft of the kettle agitators. The second conveyer discharges into the mixer bin. Either of the discharge spouts can then be cut out at will, thus allowing the calcined product to be fed into one or the other of the two bins.

Details of Kettles.—The kettles are of 3/8-in. steel, 10 ft. in diameter by 8 ft. 2 in. high, closed at both the top and the bottom, and set into the top of the enclosing brick and stone furnaces. The tops and bottoms of the kettles are convex, upward, the former much more so than the latter. Two transverse tubes or flues intersect each kettle, being placed slightly below the middle, which are also joined tightly to the sides of the kettle by rivets.

Supported in the vertical axes of the kettles, by bearings, within and without, are vertical shafts (one to each kettle), which are provided at the lower ends with two arms extending radially and curved to conform to the convex bottoms. Upon these arms are fastened scrapers for stirring the calcining gypsum. At the upper ends, which are prolonged some 6 ft. above the tops of the kettles, are large bevel gears. The arms of the agitators pass beneath the flues and above the bottoms of the kettles, thus keeping the gypsum in motion and preventing its adhering and burning out the kettles. Openings for steam pipes and for the insertion of thermometers are provided in the tops of each kettle, the former having a flue or pipe passing upward to the top of the building.

The kettles are set about two-thirds their depth into the tops of the furnaces, tight connection being made at the tops of the walls. They rest upon shoulders of the walls, which up to this point are 36 in. thick, while above the bottoms of the kettles and shoulders they are one-half their former thickness, extending upward to within about 30 in. of the top of the wall, from which point they arch to the kettles, making a tight connection. An annular space is thus left between the vertical walls of the kettles and the enclosing walls of the furnaces. Small rectangular openings run obliquely through the shoulders, which support the kettles, thus furnishing an inlet for the hot furnace air and gases to pass upward around the sides, as well as to come in contact with the bottoms, of the kettles. An enlargement of the furnace walls at one side of the top provides space for a passage connecting the annular space within with the smoke stack; thus the arrangement of passages is such as to require the gas to pass through the flues before reaching the smoke stack. Small rectangular openings in the furnace walls are provided with iron doors, which, when opened, expose the ends of the flues of the kettles, thus permitting them to be cleaned.

Metal spouts extend from the discharge openings of the kettles through the furnace walls to the hot-pit. The discharge of the kettles is regulated by slide-doors operated by rods and levers from the tops of the kettles.

Power Plant.—The power plant which furnishes electricity for driving and lighting the mill, also lighting the town, is situated at Blue Rapids, on the Big Blue river. It was formerly a flour mill, but has been fitted up with electric generators. Alternating current generators of the General Electric make furnish for transmission 38 amperes at 2,300 volts, being driven at a speed of 514 rev. per minute. The distance of transmission is some-

what over a mile, the transmitting medium being a No. 4 copper wire, which is insulated in town but not in the country. Two turbine water-wheels of 100 h. p. each, made by the McComerick Company, York, Pa., furnish the driving power for the generators. The 2,300 volts of transmission are transferred to 230 volts for mill use by three transformers, which have a capacity of 50,000 watts each. The transformers with driving motors are at the plaster mill, the latter being placed near the machinery to be driven. Besides furnishing current for the motors, 150 incandescent lights at the mill, 1,400 incandescent and 10 arc lights in town are maintained.

Manufacture of Plaster.—The process of manufacture of plaster of paris and stuccos in this mill may be outlined as follows:

Gypsum by cars to 1.

1—Crusher platform by shovel to 2.

2—Crusher reducing from all sizes up to 18 in. to 2 in. to 3.

3—Spindle crusher reducing from 2 in. to marble size and under, producing a product known as pebble, by launder to 4.

4—Elevator (pebble) to 5.

5—Pebble bin by spouts to 6 or 17.

6—Buhr-mills (48 in. diameter) reducing to flour, by spouts to 7.

7—Elevator (flour) by launders to 8.

8—Feed bin for kettles by spouts to 9.

9—Kettles: Capacity of kettles 10 tons each per run of 3 hrs. For stucco work product is drawn at 320° F. and is 'sad,' not brittle. For dental and moulding purposes the product, which is very brittle, is drawn at 335° to 340° F.

10—Hot-pit by 3 sets screw-conveyors to 11.

11—Elevator by launders or screw conveyor to 12 or 15.

12—Regrinding bin by screw conveyor to 13.

13—Regrinding buhr to 14.

14—Sacking bin—pure plaster, finished product.

15—Mixing bin to 16.

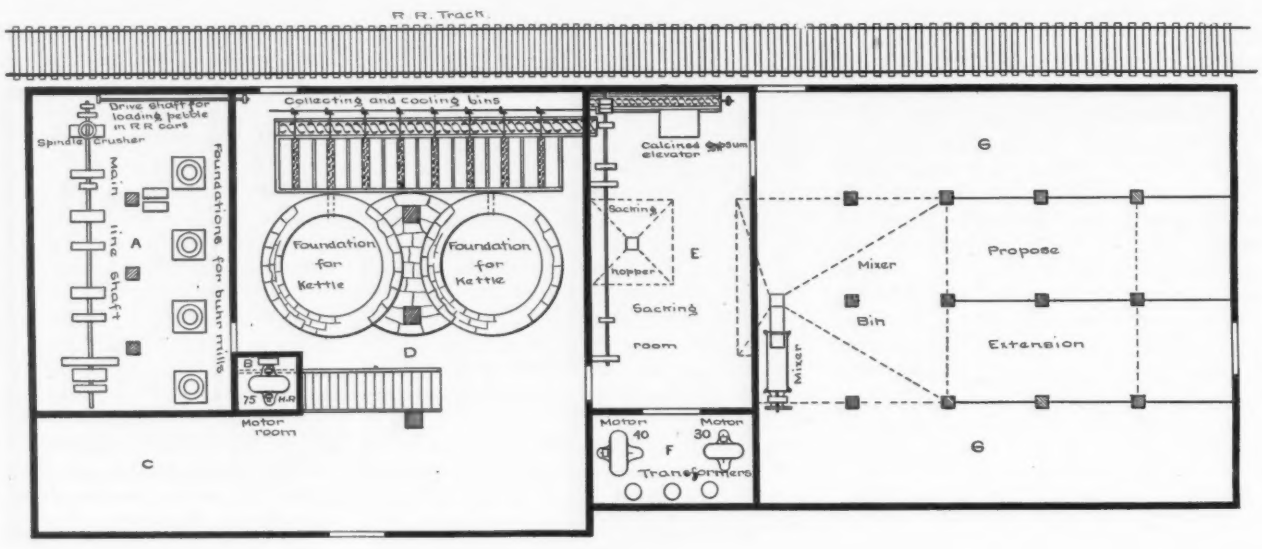


FIG. 3 FIRST FLOOR

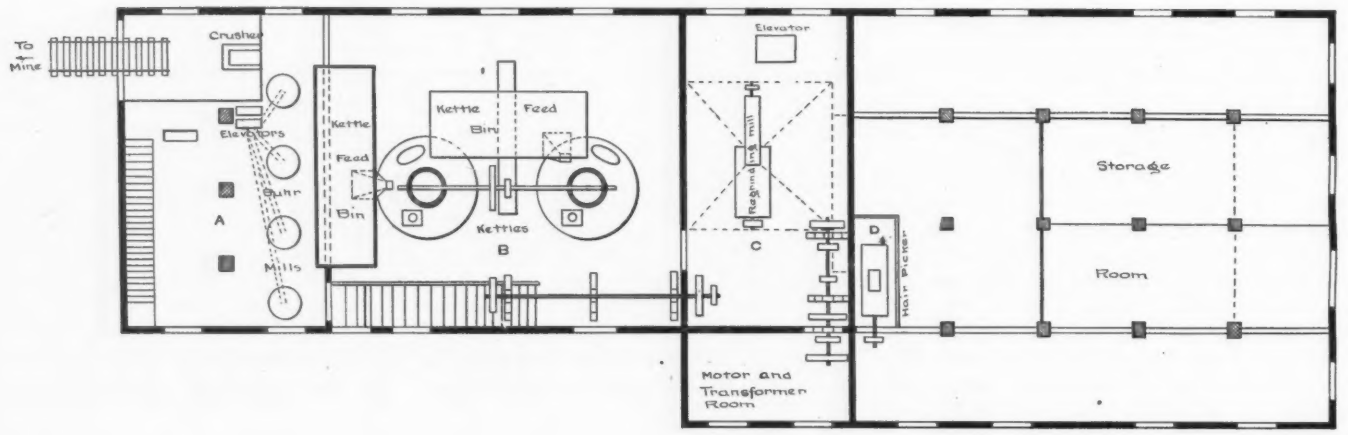


FIG. 4 SECOND FLOOR

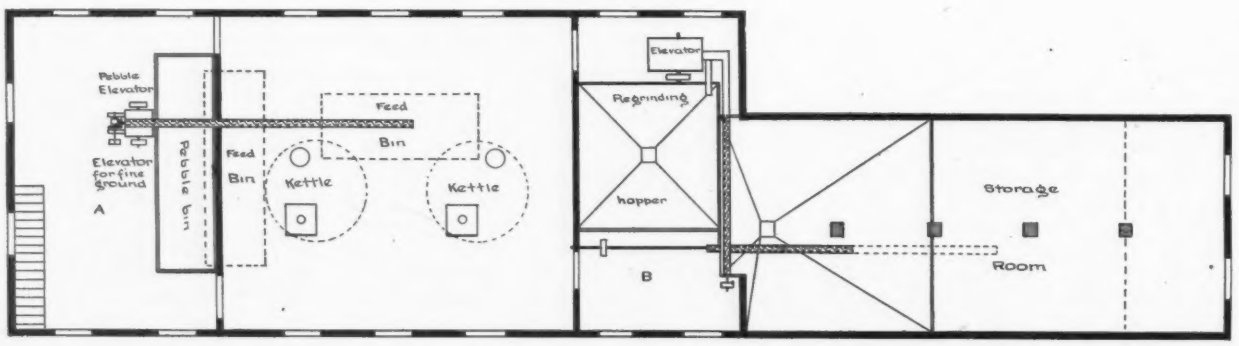


FIG. 5 THIRD FLOOR

ELECTRIC PLASTER COMPANY'S MILLS, BLUE RAPIDS, KANSAS.

16—Mixer for mixing hair and retarder (one or both) with stucco; the resulting mixture is finished product.

17—Screw conveyor feed for loading pebble gypsum into cars for shipment, finished product.

As soon as a charge has been drawn from a kettle, a fresh charge is run in and a new run begins. For 2 hours the gypsum boils at 240° F., the temperature remaining fairly uniform, after which it begins to rise and the contents of the kettle slowly increase in volume for one hour, when it reaches a temperature of about 330° F. At and between the temperatures 280° and 330° F., the boiling gypsum alternately increases and decreases in volume, thus rising and falling in the kettle until drawn.

It usually takes fully 45 minutes longer to make a run on a murky, wet day than on a clear day. Shale and clay are often added to the stucco to retard its action forming the so-called 'dirt' or 'mud' plasters. From one-fifth to one-sixth of the total bulk is shale or clay, which is added when the gypsum is run through the crusher; this makes a plaster as hard as that which has no retarder and requires less sand. The mixture of 1,000 lb. plaster with 3.5 lb. retarder forms a plaster which will set in 75 minutes; 1,000 lb. plaster with 4.5 lb. retarder form a plaster which will set in 120 minutes. The character of the water and sand used influence, to a considerable extent, the effect of the retarder.

'Crisolite,' or mud plaster, has about 16 per cent shale.

Hair, or hair and retarder, may be added to the stucco. For wall work about 2 lb. of hair is added to 1 ton stucco or a bucketful of hair to 1,000 lb. of stucco. The hair for this purpose, before it can be used, must be thoroughly picked to pieces so that it can be readily mixed with the stucco. The hair picker is a toothed drum revolving at a speed of 700 rev. per minute.

The coal employed in calcining the gypsum comes from Rich Hill, Mo., and Cherokee, Kan., and is run-of-mine. The consumption is close to 1,000 lb. per run per kettle, cost ranging from 15 to 18c. per ton of plaster.

An attempt has been made to introduce the German process of making artificial marble out of the gypsum. Excellent imitations have been made, which compare favorably in markings, color and durability with the domestic and foreign varieties. Not much progress has been made along this line and it is improbable that the idea will meet with much favor, as a prejudice will have to be overcome. The cheapness of such materials, compared with the genuine article, ought, however, to have considerable influence, especially if tests prove its value.

A NEW LEAD-ZINC DEPOSIT IN GERMANY.—It is reported that a large deposit of lead-zinc ore has been found near Loutzen, southwest of Aachen, Germany. The deposit has been proved by boring operations, and will be developed in the near future.

NEW PETROLEUM FIELD IN RUSSIA.—Explorations have been carried on for some time in the district of Berkeh, about 250 km. from Baku, and as they have been attended with success, active production is expected in the near future. It is intended to ship the crude oil to Baku for refining.

PIG IRON PRODUCTION BY GRADES.

Prior to 1900, detailed statistics of the production of all leading grades of pig iron were not collected by the American Iron & Steel Association, but for 1900 and 1901 full and complete reports were received from all manufacturers and printed in the *Annual Statistical Report* of the Association for the year last named. In the tables which follow the production of pig iron in the United States by grades is given for 1902 and 1903. A few thousand tons of castings from the furnace are included in the totals for white and mottled and miscellaneous grades of pig iron for each year. High silicon pig iron is included in the foundry figures.

The bessemer figures include low-phosphorus pig iron, that is, iron running below 0.04 per cent in phosphorus. Iron containing from 0.04 to 0.10 per cent of phosphorus is classified as bessemer. The basic figures are confined strictly to pig iron made with mineral fuel, and do not include the small quantity of basic iron that is annually made with charcoal, practically all of which is used by manufacturers of steel castings.

The following table gives by grades the total production of pig iron in the United States in 1902 and 1903, in gross tons of 2,240 lb.:

	1902		1903	
	Tons.	Per ct.	Tons.	Per ct.
Bessemer and low phosphorus	10,393,168	58.3	9,989,908	55.5
Basic pig	2,038,590	11.5	2,040,726	11.3
Forge iron	833,093	4.7	783,016	4.3
Foundry and high silicon	3,851,276	21.6	4,409,023	24.5
Malleable bessemer	311,458	1.7	473,781	2.6
White, mottled, etc.	180,741	1.0	120,137	0.7
Spiegeleisen	168,408	0.9	156,700	0.9
Ferromanganese	44,573	0.3	35,961	0.2
Totals	17,821,307	100.0	18,009,252	100.0

The increase last year was entirely in the foundry and malleable bessemer grades of iron.

Of the total production of pig iron in 1903, over 55.4 per cent was bessemer and low-phosphorus, as compared with over 58 per cent in 1902; 24.4 per cent was foundry, against 21.6 per cent in 1902; over 11 per cent was basic, against about 11 per cent in 1902; 4.3 per cent was forge, against 4.6 per cent in 1902; over 1 per cent was spiegeleisen and ferro-manganese, against 1.19 per cent in 1902; and 2.6 per cent was malleable bessemer, against 1.7 per cent in 1902. The production of white and mottled and miscellaneous grades of pig iron and of castings made direct from the furnace amounted to a little over 1 per cent in 1902 and to less than 1 per cent. in 1903.

In 1903 the production of low-phosphorus pig iron, which is chiefly used by manufacturers of acid open-hearth steel, amounted to 200,422 tons, against 164,246 tons in 1902. In 1903 it was made by four States, namely, New York, Pennsylvania, Tennessee and Ohio. In 1902 all the States named made low-phosphorus iron except Ohio. New Jersey, which made low-phosphorus iron in 1902, did not report any for 1903.

Included in the 4,409,023 tons of foundry iron made in 1903 are 51,516 tons of ferro-silicon, produced in Virginia, West Virginia, Kentucky, Tennessee, Georgia and Ohio, a small part of which was made with electricity. For 1902, ferro-silicon was not separately collected. Pig iron containing 7 per cent of silicon and over is classified as ferro-silicon.

Pennsylvania was the largest producer of bessemer and low-phosphorus pig, reporting 5,213,143 tons. Other large producers were Ohio, 2,422,676 tons; Illinois, 1,386,683 tons; Maryland, 321,784 tons. Pennsylvania also made the most basic pig, 1,417,253 tons; Ohio coming second with 190,840 tons, and Alabama third with 172,280 tons.

In forge iron, Pennsylvania stood first, with 433,925 tons; Alabama coming second, with 155,937 tons. Alabama led in foundry iron, with 1,194,566 tons; other large producers being Pennsylvania, 948,957 tons; Ohio, 416,850 tons; Virginia, 415,403 tons; Tennessee, 350,966 tons, and New York, 304,667 tons.

RECENT LITERATURE ON ECONOMIC GEOLOGY V. FUELS.

By H. FOSTER BAIN.

Coal Deposits of Washington. By Henry Landes and C. A. Ruddy. Washington Geological Survey, Annual Report, 1902. Vol. II. pp. 165-277.

The coal deposits of Washington are found within Puget sound basin and the Cascade mountains. They were formed in the early Tertiary (Eocene) period and occupy a broad discontinuous belt extending across the State from north to south. They range in character from lignitic to semi-anthracite, including both coking and non-coking grades of bituminous. The individual beds are numerous and of good workable thickness, but have, in the main, been much broken and faulted during the processes of mountain-making. In general, the greater the deformation the higher the grade of the coal, but the more complex the mining problems.

The importance of the field arises from the proximity of the mines to tidewater, and it has long been drawn upon to supply the California market. The disturbing effect of the introduction of fuel oil in that State was for some time felt in this field, but shipments have been resumed and local consumption is also increasing rapidly. The individual districts and mines are described in this report in detail and the situation of the different coalfields is indicated on a small but useful geologic map of the State. The character and fuel value of the individual beds are illustrated by analyses and boiler-tests. An evaporative power per pound of coal ranging from 5.96 to 6.82 is indicated by tests made at the Mare Island Navy Yard, while boiler-tests on the United States steamship *Yorktown* resulted in a consumption of 2.50 to 4.45 lb. per h.p. per hour. The production, 1902, amounts to 2,690,789 tons, of which 1,039,870 was produced by the Northwestern Improvement Company. Coke was made in three establishments, the total yield being 40,569 tons.

Coal Resources of the Yukon Basin, Alaska. By Arthur J. Collier. *Bulletin* 213, United States Geological Survey, pp. 276-283.

The author describes the development at various points along the river from the International boundary down, giving measurements of the thickness of the beds and determinations of the water and ash contents. He reaches the following conclusions: The coal-bearing formations are distributed along the Yukon, convenient for steaming purposes, from the international boundary nearly to the mouth of the river. The beds are practically undeveloped, though limited amounts have been mined at eight different points. Probably 9,000 tons have been produced from American territory and sold at $10 to $20 a ton. The

seams vary in thickness from 13 in. to 5 ft., and in some instances have been crushed and broken so that they are very irregular. The coal varies from lignite to semi-bituminous. It has been used principally on river boats. The Yukon will probably never supply coal for export, but will furnish all that will be required for local use.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

South Australia Statistical Record, 1902. Compiled from Official Records. Adelaide, S. A.; Government Printer. Pages, 316.

Re-inforced Concrete Construction. By L. J. Mensch. Chicago; *Cement and Engineering News.* Pages, 220; illustrated. Price, $2.

Quantitative Analysis for Mining Engineers. By Edmund H. Miller. New York; the D. Van Nostrand Company. Pages, 144. Price, $1.50.

Rock Phosphates and Mineral Fertilizers. By Charles Chewings. Adelaide South Australia: Government Printer. Pages, 48; with map.

Report on the Mining Districts of Idaho, 1903. By Robert N. Bell, State Inspector of Mines. Boise, Idaho: State Printer. Pages, 144; illustrated.

United States Geological Survey. Production of Coal in 1902. By Edward W. Parker. Washington: Government Printing Office. Pages, 204.

Die Elektrometallurgie der Alkalimetalle. By H. Becker. Halle-a-S., Germany; Wilhelm Knapp. Pages, 136; illustrated. Price (in New York), $2.

Transactions of the American Institute of Mining Engineers. Volume XXXIII. New York; published by the Institute. Pages, 1120; illustrated.

Traité d'Analyse des Substances Minerals. Tome II. Metalloides. By Adolphe Carnot. Paris, France; Veuve Ch. Dunod. Pages, 824; illustrated. Price (in New York), $8.75.

Traité Theorique et Pratique des Moteurs a Gaz et a Petrole. Tome II. Fourth Edition. By Aimé Witz. Paris, France; E. Bernard. Pages, 632; illustrated.

University of Texas Mineral Survey. Report of Progress, 1903. *With Map of Terlingua Quadrangle.* William B. Phillips, Director. Austin, Texas; State Printers. Pages, 14; with map.

United States Geological Survey. Geology of the Globe Copper District, Arizona. By Frederick Leslie Ransome. Washington; Government Printing Office. Pages, 168; with maps and illustrations.

Register of Mines. and Minerals of Butte County, California. Prepared by the State Mining Bureau. San Francisco, Cal,; published by the Bureau. Pages, 12; with map. Price, 25 cents.

United States Geological Survey, Production of Natural Gas in 1902. By F. H. Oliphant. Pages, 50. *The Stone Industry in* 1902. Pages, 82. Washington; Government Printing Office.

Traité Theorique et Pratique de Metallurgie Generale. Volume I. Elements et Produits des Operations Metallurgiques. By L. Babu. Paris, France; Ch. Beranger. Pages, 588; illustrated. Price (in New York), $8.75.

The Boulder Beds of Ventersdorp, Transvaal. By Frederick H. Hatch. Reprinted from *Transactions* of the Geological Society of South Africa. Johannesburg, Transvaal; Grocott & Sherry. Pages, 4; with map.

Statistique de l'Industrie Minerals en France et en Algerie, 1902. Prepared by the Division of Mines of the Ministry of Public Works. Paris, France; National Printing Office. Pages, 272. Price (in New York), $3.50.

The Metallurgy of Steel. By F. W. Harbord. With a section on *Mechanical Treatment of Steel.* By J. W. Hall. London; Charles Griffin & Company, Ltd. Philadelphia; the J. B. Lippincott Company. Pages, 760; illustrated. Price, $9.

Western Australia Geological Survey. Bulletin No. 8. Geological Sketch Map Murchison Gold-field. By Charles G. Gibson. *Bulletin No. 9. Geological Map and Results of Boring for Copper and Lead.* By A. Gibb, Maitland. Perth, W. A.; Government Printer.

The Organization of Gold Mining Business. Second Edition. By Nicol Brown. Glasgow: Duncan Campbell & Son. London: E. & F. N. Spon, Ltd. New York: The ENGINEERING AND MINING JOURNAL. Johannesburg, S. A.; J. C. Juta & Co. Pages, 220; with blank forms. Price, in New York, $10.

BOOKS REVIEWED.

The Michigan Technic, 1903. Ann Arbor, Mich., 1903; published by the Engineering Society of the University of Michigan. Pages, 101; illustrated.

This annual contains a variety of papers on engineering topics contributed by the professors and students of Michigan University. Some of the subjects discussed at length in the present issue are: Some Phases of Hydraulics; Factory and Warehouse Architecture; Anchor Ice; The Electron Theory; Telephone Engineering; Screws; and Status of the Steam Turbine. The annual compares favorably with similar publications from other universities and technical schools, and does credit to the society which it represents.

American Meter Practice. By Lyman C. Reed. New York, 1903; the McGraw Publishing Company. Pages, 196; illustrated. Price, $2.

This book describes the current practice in the United States of metering the output of central stations. The author has selected an example from each well known and representative type of meter, and has stated the principles underlying the construction and operation. An idea as to the ground covered in the book may be gained from the subjects of the different chapters, which are as follows: Measurement of Power in Direct Current Circuits; Measurement of Power in Alternating Current Circuits; Meter Selection; Torque and Friction; Edison Chemical Meter; Thomson Recording Wattmeter; Duncan Recording Wattmeter for Alternating Current; Duncan Wattmeter for Direct Current; Stanley Recording Wattmeter; Guttman Wattmeter; Westinghouse Induction Meter; General Management of the Meter Department; Reading Meters; Value of Losses in Meters Relative to Income; Differential Rating; and Elements of Photometry.

The Restoration of the Ancient Irrigation Works on the Tigris, or the Re-Creation of Chaldea. By Sir William Willcocks, Cairo, 1903; National Printing Department. Pages, 71; with maps.

In this paper is given a brief description of the evidences of ancient irrigation works in the land of Chaldea, now comprised in the Asiatic possessions of Turkey. This country is now being opened up by the railroad extending from the eastern side of the Dardanelles through Asia Minor, and which will ultimately be continued to Bagdad. With the prosecution of this important work, it is planned to reopen the old irrigation canals along the Tigris river, and to assist in the development of the agricultural resources of the country. The author shows that there is a vast extent of land along the Tigris and Euphrates which needs only a regular supply of water to make it exceedingly fertile. The contemplated improvements are in line with those recently carried out in the Nile valley.

Bulletin of the University of Wisconsin, No. 83. The Progress of the Ceramic Industry. By Edward Orton, Jr. Madison, Wis., 1903; published by the University. Pages, 21.

This is an interesting essay on the progress and relative development of the ceramic industries in the United States, including under this title not only various manufactures of clay, but also those of glass and cement. The author, who is widely known from his numerous contributions to technical and scientific literature, handles the subject in a very interesting and suggestive way. Attention is called to the fact that, with the depletion of our forests, builders must naturally make increased use of clay products, and that the near future is likely to witness an enormous development in the ceramic industries. The author believes that the technology of clay and allied products should be given a larger place in our technical schools and universities, as there is a great need for trained engineers who shall aid in building up the industry on a plane corresponding to the present development of the industry in Germany.

Experimental Researches on Reinforced Concrete. By Armand Considère. Translated and arranged by Leon S. Moisseiff. New York; McGraw Publishing Company. Pages, 188; illustrated. Price, $2.

The investigations described in this book were first given to the public in a series of papers that appeared in the transactions of the French Academy of Sciences, in *Génie Civil,* and the reports of the International Congress of Methods of Testing, during the period from 1899 to 1901. The translator has arranged and classified the different papers so as to make,

as far as possible, a coherent treatise. The subjects discussed are as follows: Reinforced Concrete in Bending; Deformation and Testing of Reinforced Concrete Beams; Effects of Changes in Volume of Concrete; Tensile and Compressive Resistance of Reinforced Concrete; Resistance of Concrete to Shearing and Sliding; Effect of Cracks on Stresses and Deformations; and Compressive Resistance of Reinforced and Hooped Concrete. The use of reinforced concrete has expanded very rapidly in recent years, especially in France and Germany, and it is now being introduced for structural purposes into the United States and other countries. Its importance is such that every civil engineer ought to familiarize himself with its properties, and the present volume, which describes the researches of a noted authority on the new material, may be commended to engineers as worthy of their study.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The James Watt Memorial.

Sir.—A memorial statue is about to be erected in Greenock, Scotland, on the site of the humble cottage in which James Watt was born.

For this purpose subscriptions of small amounts are being solicited in many countries, as it is felt that the memorial should represent the contributions of the thousands who know and appreciate what the invention of the steam engine has meant to the material progress of the world.

Should you desire to associate yourself with this movement, kindly send five dollars, or less, and accompany the contribution with your autograph on the enclosed slip.

The latter is desired for transmission to Greenock, to show the number of the American contributions.

Our country has, probably, been the greatest beneficiary of Watt's labors, and the committee hopes that the response from the United States will exceed that of any other country in point of numbers, as the number of subscribers is a greater tribute than the amount subcribed.

ANDREW CARNEGIE,
Chairman of Committee.

No. 99 John Street, New York.

Mining Opportunities in Bolivia.

Sir.—The great mining enterprises which have been organized recently by capitalists in this country, lead me to think that perhaps you will be interested in learning something about the wonderful resources of Bolivia.

I am confident that it would require no very great capital to obtain full possession of the old mines of Potosi, which, as yet, have been worked only in the superficial portion: the deepest shaft being only about 30 ft. above the level of the city. According to statistics, these mines have yielded ore to an immense value, although the methods of carrying on operations were very primitive. These mines alone, without considering the great ore-deposits in the surrounding district, still contain ore to the value of millions of dollars. All that is necessary to make operations successful to-day is an intelligent and modern system of mining.

I venture to ask whether you would be interested in bringing the matter to the attention of capitalists in your country. To organize a company successfully requires that negotiations with the present owners be carried out with great foresight, as if they should get news of a foreign company entering the country, they would immediately raise the values 100 per cent.

I may call to your attention that Potosi is to-day the second city of Bolivia in importance, and within two years will have railroad connection with the outside world. I shall be very glad to furnish further information.

WALTER EICHHORN.

Potosi, Bolivia, Feb. 1, 1904.

Revolutionary Metallurgy—Metalia, Ltd.

Sir.—Under the above heading there has been brought to my notice an article appearing in your issue of February 11, stating that circulars "of a misleading nature" are being sent out from London by Metalia, Ltd., of which I have the honor to be a director, and as I am also the inventor of the process which seems to have so much alarmed and upset you, I must ask you, in common fairness, to publish my explanation as below in your next issue.

Allow me to state, sir, that the reactions described in my specification No. 23,848, if not generally known, are, nevertheless, absolutely accurate, and derived from actual experimentation, as anybody who wants to take the trouble may convince himself by repeating my experiments, in which case I am willing to supply any further information, if required on application; and I am sure that if you choose this way of testing the facts described in my specification you will become one of the first converts to the "revolutionary metallurgy."

You state that "silver if acted on by this mixed solution would be transformed into chloride and would remain in the gangue." Of course, silver would be transformed into chloride; but, as is also well known, silver chloride is soluble in brine solutions either cold or hot, and still further in acidulated chloride solutions. This is a very well known fact, and I have no doubt that it is known to you, but if only to refresh your memory, I will quote several undoubted authorities on the subject.

According to Vogel ('Wagner's Jahresberichte,' 1874, Vol. XXII., p. 481) "Silver chloride is soluble in the chlorides of all the alkalies and alkaline-earths." "A solution of common salt saturated at 15° C. dissolves per liter 1.001 gram of silver chloride." (Halin & Vogel.) "Silver chloride (Ag Cl) dissolves appreciably in strong hydrochloric acid and in a solution of common salt." (Roscoe's 'Chemistry,' p. 228.) These quotations will be found repeated over and over again in all works referring to chemistry and metallurgy. They are common practice. That gold will also remain in the gangue may or may not be. It depends on the way in which the process is worked, within specification 23,848. As to the lead, when dealing with complex ores, paragraphs Nos. 10, 40 and 45, referring to it, will be plain enough to any practical chemist.

"The active agents in this mixture" are not only the perchloride of iron and the hydrochloric acid as you say, but also, as I have before pointed out and in the "usual way" the alkali and alkali-earthy chlorides, which, as silver and chloride of silver solvents, play an active part in the process.

The wording "the recovery of the metals from the solutions in the usual way" is not used in my specification No. 23,848, as quoted, but in claims 1, 3, 4 and 5 of the said specification the following words are used: "and recovering the metals in the usual way as herein described." In quoting, the sense of a phrase is materially altered if the whole phrase is not quoted, and as the way of recovering the several metals is minutely and distinctly described in the body of my specification, paragraphs Nos. 35, 40, 50, 5 and 3, there is not the "alleged vagueness," only in your mind.

As regards the other reasons, scientific or otherwise, for doubting the soundness of this metallurgical enterprise, which I beg to assure you is sound enough—these are matters of personal opinion, and I cannot believe that yours bear the seal of infallibility. In these matters precise facts and an unbiased judgment are the only sound grounds on which criticism can be based.

I am glad to hear that "there are other grounds for doubting the soundness of this metallurgical enterprise." I am ready to deal with those other grounds when pointed out to me.

J. BAXERES.

London, Feb. 19, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

Osceola Consolidated Mining Company.

This company owns several producing mines in the Lake Superior copper district in Michigan. Its report is for the year ending December 31, 1903.

The results of the year are reported as below, with the averages per pound of refined copper made:

	Amount.	Per lb. copper.
Copper sales	$2,087,692	13.00
Interest, etc.	18,232	0.11
Total receipts	$2,105,924	13.11
Expenses at mine	$1,321,193	8.23
Smelting and selling copper	201,577	1.25
New construction	129,419	0.81
Total expenses	$1,652,189	10.29
Net profit	$453,735	2.82

From the net earnings a dividend of $1 per share, $96,150 was paid, leaving a balance of $357,585 for the year. The debit balance carried over from 1902 was $226,025, leaving a surplus of $131,060 forward to current year.

Some comparative results are shown in the table below:

	1902.	1903.
Rock stamped, tons	836,400	924,400
Mineral, lb.	18,430,012	21,904,243
Refined copper, lb.	13,416,396	16,059,636
Copper in mineral, per cent.	72.8	73.3
Copper, per ton of rock, lb.	16.0	17.4
Cost of copper per lb., cents	11.77	10.29
Cost of mining, per ton, cents	137.26	125.56
Cost of stamping, per ton, cents	21.74	17.44

The total rock hoisted in 1903 was 992,819 tons, of which 68,419 tons were rejected as waste.

The superintendent's report shows that, at the Osceola branch, No. 5 shaft was repaired. Sufficient development work was done to keep up the production of 25,000 to 30,000 tons of rock per month. At the Tamarack Junior

branch operations during the year were confined to the exploratory work below the 12th level. The winze was sunk to a depth of 368 ft. below the 12th level, and a drift was then driven north from the bottom of the winze a distance of 187 ft. Nothing of an encouraging nature was met with, and all work has been stopped. The underground equipment, consisting of cars, tracks, engines, pumps, etc., has been removed and transferred to the other branches of the mine, where it will be used again as occasion requires.

At the South Kearsarge branch the openings for the year amounted to 5,306 ft., which includes 619 ft. of shaft sinking. No. 1 shaft is now down to the 9th level, and No. 2 is within a few feet of the same point. As both shafts were bottomed at the 6th level at the beginning of the year, three levels have been added in each. Drifting is under way in the 12 new places which are thus made available, and these drifts are showing up good stretches of stoping ground that make a valuable addition to the reserves. The output of rock from this branch was greatly increased during the year. For the last six months the average monthly shipment of rock was over 27,000 tons. This is an increase of over 11,000 tons per month above the best month of last year. Owing to the increased compressor capacity, it has been possible to do a greater amount of stoping than was done formerly. The ratio between stopes and openings is now much closer to good mining practice, and the cost per ton has reached a more satisfactory figure.

At the North Kearsarge branch, at the opening of the year, No. 1 shaft had been timbered from surface to the 18th level. The work was continued until the timbering was completed to the 24th level before any attempt was made to put the shaft in commission. This condition was reached in April and a small product was secured during that month. Since that time the output has shown a steady increase, and has been limited only by the number of machines that could be economically operated in the tributary territory. A large block of ground can be opened around this shaft which, according to the evidence now available, should be found productive, and insure for the shaft a large supply of shipping rock. The equipment of the shaft is as complete as could be desired, and the opportunity for cheap production from this time on is evident. The shipments of rock at present are at the rate of 14,000 tons per month, and are increasing regularly. By the middle of this year it is hoped to reach an output of 20,000 tons per month.

At the stamp-mill the results of the year's work are very gratifying The cost of stamping has been reduced to a figure which is undoubtedly a new mark in mill work. To obtain such results the plant must be in good condition all the time, and close attention given to the details of its operation.

Delaware, Lackawanna & Western Railroad Company.

This company, besides its railroad system extending from New York to Buffalo, with numerous branches, owns and operates an extensive coal estate in the Wyoming district of the anthracite region of Pennsylvania. Contrary to the practice of most of the anthracite carrying companies, it operates its coal properties directly, and not through the medium of a subsidiary company. The report is for the year ending December 31, 1903.

The total earnings of the railroad were $29,180,964, of which $13,826,144 came from the transportation of coal. The total coal carried was 8,960,684 tons; giving 1,592,766,602 ton-miles. The average haul of coal was 178 miles, and the average rate was 0.868c. per ton-mile.

The statement of coal mined and sold for two years is as follows:

	1902.	1903.	Changes.
Coal on hand, Jan. 1	456,270	161,584	D. 294,686
Coal mined & b'ght	5,052,698	9,130,680	I. 4,077,982
Total	5,508,968	9,292,264	I. 3,783,296
Coal used by Co.	1,016,161	1,207,358	I. 191,197
Coal sold	4,331,223	7,428,986	I. 3,097,763
Total	5,347,384	8,636,344	I. 3,288,960
On hand, Dec. 31	161,584	655,920	I. 494,336

It must be remembered in looking over this statement that 1902 was an abnormal year on account of the strike. The production for 1903, however, was the largest ever reported by the company.

The statement of the Coal Department of the company may be summed up as follows:

	Tons.	Amount.	Per ton.
Sales at mines	104,571	$210,077	$2.01
Company's supply	1,207,358	1,208,412	1.00
Local agencies	5,514,888	21,703,488	3.94
Foreign agencies	1,809,527	11,221,108	6.20
Total coal sales	8,636,344	$34,343,082	$3.98
Earnings of barges	705,349	234,023	0.33
Increase in coal on hand.	494,336	1,685,339	3.41
Total earnings	9,130,680	$36,262,444	$3.97
Coal mined and bought	9,130,680	$16,337,762	$1.79
Transportation, D. L. & W. lines	7,617,383	$13,243,782	$1.74
Transp'tn foreign lines	2,608,647	1,614,514	0.62
Total transportation	7,617,383	$14,858,296	$1.95
Handling and selling	7,324,415	1,404,193	0.19
Vessel expenses		225,999	....
Extraordinary imp'mts		400,000	....
Total expenses	9,130,680	$33,226,250	$3.64
Net earnings	9,130,680	$3,036,194	$0.33

The report says: "The demand for anthracite coal throughout the year 1903 seemed to be limited only by the ability of the producing companies to mine and transport it to market. The tonnage mined and bought by this company was 1,750,000 tons greater than during any previous year in its history.

"The award of the commission appointed by the President of the United States to settle the anthracite strike, was rendered in March. In effect it granted the miners and certain other employees an increase in wages of 10 per cent, effective from November 1, 1902, about the date work was resumed. To other mine employees the old wages were given for a work-day of nine instead of 10 hours, the length of the work-day previous to the strike. The wages of all mine employees were advanced 1 per cent for every 5c. per ton realized by the anthracite companies for the larger or prepared sizes of coal in excess of $4.50 per ton at tidewater. This sliding scale became effective after April 1, 1903, and under its operation the wages have been advanced gradually since that date to a maximum of 7 per cent more than the original award. This maximum was reached in October last and will continue until the usual spring reduction in prices becomes effective on April 1 next, when the wages will, no doubt, be reduced to the basis fixed by the original award of 10 per cent. The commission in its award fixed the period of its operation as three years from April 1, 1903, and pursuant to its recommendations a conciliation board was constituted, to which all questions arising under the terms of the award or differences of any kind between the mine operators and their employees on which they cannot agree, will be referred for decision. If this board is unable to agree on any matters submitted to it, such questions are to be referred to an arbitrator, who shall be named by a judge of the United States court.

"The operators and their employees, with hardly an exception worthy of note, accepted the terms of this award in good spirit, and in good faith—so far as the officials of this company have knowledge—endeavored to carry out its provisions. Differences have arisen which, for the most part, have seemed to be honest. Many of these have been adjusted between the mine employees or their representatives and the officials of the operating companies. Others have been submitted to the conciliation board, and a few have been referred from the latter to an arbitrator. All the decisions rendered have been accepted and acted upon as made without serious trouble or interruption of mining operations.

"It would appear, therefore, as though the anthracite companies are reasonably sure that during the period of this award or until April 1, 1906, their relations with their mine employees will continue harmonious and quiet, and their chief concern during this period will be whether the demand for coal and market conditions generally, including the competition of soft coal and other fuels, will be such as will permit of their realizing from the sale of anthracite coal, prices that will enable them to pay the high wages fixed by the award and leave them a fair margin of profit. The present outlook is certainly reassuring as to this. The officials and employees connected with the mining operations of this company have worked most harmoniously during the year. The few differences or questions that have arisen have been promptly adjusted between them with but two unimportant exceptions, and these having been referred to the conciliation board, the latter unanimously decided them in the company's favor.

"The company's mining operations during the year were prosecuted vigorously and successfully without serious accident or casualty, and with the development work done and improvements made, the management believes its coal properties were never in better condition than at the close of the year. It can hardly be expected that so large a tonnage of anthracite coal can be as readily marketed during the coming year as in 1903. If, however, it shall appear later that such is possible, this company is in position to mine, sell and transport as much or more during the year 1904.

"Included in the figures showing the total coal tonnage of the company for the year are 1,004,597 tons of washery coal, for steam purposes, taken and prepared by the washeries from the old culm banks of the company. There are five of these washeries now in operation, and their product finds an almost unlimited market among the factories and users of steam in New York and at other points on the line at prices in competition with any steam fuel in the market and which more than pay for cost of production and rates of transportation.

"The improvements made during the year cost $333,471. They were all made in pursuance of well considered and matured policy and plans for developing the company's mining properties, improving the quality of its coal and cheapening the cost of its production."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Talc.—Who are the chief users of talc? What are principal uses to which this material is put?—J. N.

Answer.—Talc is largely used in making paper, to give weight and body; also to aid in giving surface and finish to some kinds of papers. It is used also in packing canvas-covered hams. The finer kinds of non-fibrous talc are used in making toilet powders. Large buyers are John C. Wiarda & Co., Brooklyn, N. Y.; Hammill & Gillespie, 240 Front street, New York; the International Paper Company, 30 Broad street, New York.

Ground Quartz.—I note in your columns quotations on ground and lump quartz. Can you tell me to what sized mesh the quartz should be ground? I would like also to know the names of some dealer or importer in the United States.—J. R. S.

Answer.—Ground quartz, as usually sold here, should be ground or crushed to 120 mesh. The finer and more uniform the grain, the higher the price. The present quotations vary from $9 per ton for ordinary, up to $12 or $13 for best quality. Lump quartz is quoted $2.50 to $4, according to quality. These prices are for New York delivery. The principal importers are Hammill & Gillespie, No. 240 Front street, New York.

Thorium and Cerium.—I am interested in the rare earths, or earth-metals, and would like to know the names of buyers of cerium, thorium and the metals of the thorium group, which are used in making incandescent mantles. I would also like to know the names of some books on the rare earths.—A. E. P.

Answer.—The rare metals you mention are, of course, used chiefly by the Welsbach Incandescent Light companies. Dealers in these earths include the Roessler & Hasslacher Chemical Company, 100 William street, New York; E. P. Earle, 29 Liberty street, New York; the Welsbach Company, Philadelphia.

As to books on the rare metals, we may mention Browning's 'Introduction to the Rare Elements,' price $1.50; Ohly's 'Analysis, Detection and Commercial Value of the Rarer Metals,' price $3. Some information is given about them also in 'The Mineral Industry.'

Radium.—Can you tell me whether radium has been found in zinc-blende? There is an old mine in Wythe county, in Virginia, which was worked many years ago, but has not been worked since the war of 1861-65; it still contains much zinc-blende. Where could I have analyses made?—E. W.

Answer.—The discovery of radium is so recent, and our knowledge of it is still so limited, that it is difficult to say whether it can, or cannot be found in a certain mineral. So far radium—or rather its salts—have been obtained from ores containing uranium. Powdered zinc-blende, when exposed to the so-called radio-active rays, will give out a beautiful purplish light.

You will find in the advertising columns of the JOURNAL the names of a number of reliable assayers and chemists, who will make analyses of your ores.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON FLITTERS.—So-called flitters, made from sheets of copper and zinc and reduced to a fine condition for use in the same manner as bronze powder, are free of duty under the provision in paragraph 533, tariff act of July 24, 1897, for "all composition metal of which copper is a component material of chief value."—Appeal of George Meler & Company; United States Circuit Court, Southern District of New York.

DUTY ON COPPER WIRE CABLE FOR SWITCHBOARDS.—*Held* that a cable used for making connections with a telephone switchboard, consisting of 64 wires bound together, which, both individually and in the group, are covered with various materials for insulating and waterproofing purposes, is an 'article' within the meaning of the second proviso in paragraph 137, tariff act of July 24, 1897, relating to "articles manufactured from . . . copper wire," and is not dutiable under the provision in the same paragraph for "wire not specially provided for . . . whether uncovered or covered," nor under paragraph 193 as a manufacture of metal, not specially provided for.—In the case of Salt; United States Circuit Court, Southern District of New York.

VALIDITY OF LOCATION OF CLAIM BY AN AGENT.—There is no provision of law prohibiting the location of a claim or the doing of any of the acts required to complete the appropriation by an agent, and the fact that the locator acted through an agent in such matters does not invalidate the location.

The object of the statutory provision requiring annual assessment work on mining claims is to give substantial evidence of the locator's good faith and the law should be liberally construed with that end in view; a compliance with the statute may be proved by any evidence which establishes that the work done and improvements made are reasonably worth the sum of $100. The law of Nevada (Statutes 1887, page 136, chapter 143) providing for the recording of the evidence of the doing of the annual assessment work on mining claims, is designed merely to preserve such evidence and a failure to record the prescribed affidavit does not preclude the owner of the claim from making the necessary proof of work by any other evidence, nor is the record, if made, conclusive. The burden of proving an abandonment of a mining claim or of the required annual assessment work has not been done so as to render it liable to relocation rests on the party asserting it and the proof must be clear and convincing to establish a forfeiture.—McCulloch v. Murphy (125 *Federal Reporter*, 147); Circuit Court of the United States for Nevada.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending March 8, 1904.

753,844. PORTABLE MACHINE CAPABLE OF BENDING OR MOULDING SHEET-ZINC.—Auguste H. Bif, Boisguillaume, near Rouen, France. The combination with the table of shoes secured adjacent the ends thereof, a spindle journaled in the shoes with a rail supported by the spindle, a lever for operating the rail, a screw-threaded socket secured above the table with arms connected to the socket and to the table for supporting the socket, a threaded shaft extending through the socket, the inner faces of the shoes having guide-grooves formed therein, an iron having its ends extending in said grooves, a sleeve on the shaft connecting the shaft to the said iron whereby the said iron will be raised and lowered by the operation of said screw-threaded shaft, and counterpoises on the ends of the said spindle, and an angle-iron detachably secured to the under face of said first-named iron, said rail having its base normally lying in horizontal alignment with the surface of the table.

753,857. LOCKING-LATCH FOR DOORS OF COAL-CARS.—Albert T. Correll, Bradenville, Pa. A locking-latch for swinging doors, consisting in a vertically-sliding bar, a guide for said bar, a swinging bolt pivoted to the lower end of said bar, and a staple secured to the body of the car so as to form a pocket adapted to receive and retain the end of the swinging bolt.

753,875. ELECTRICAL MANUFACTURE OF IRON ALLOYS.—Gustave Gin, Paris, Franc. A process for electrically producing an alloy of iron with the simultaneous production of oxides of alkalies, consisting of mixing a silicic acid with the sulphate of the alkali, adding carbon to the mixture heating the same in an electric furnace with the production of the silicate of the alkali, then introducing this alkali silicate into a second furnace, adding an oxide of iron, and carbon thereto, heating the same with the production of ferrosilicon and oxide, of the alkali, and collecting the oxide of the alkali in the form of a sublimate of the same.

753,981. MACHINE FOR STAMPING OR SHAPING PLASTIC CLAY, SHALE, ETC., INTO VARIOUS PATTERNS OR ARTICLES.—Edmond C. Hoelsche, Chicago, Ill. In a machine for stamping and shaping a series of articles or patterns from a strip or ribbon of clay or other plastic material, the combination of a frame with a pair of rollers mounted parallel to each other and adapted to rotate therein, suitable driving-gears and means in connection with said rollers to cause them to rotate in unison and suitable dies or shaping-surfaces made on the periphery of said rollers.

753,986. PUMP.—Ferdinand W. Krogh and Carl A. Krogh, San Francisco, Cal. A centrifugal pump having a non-secured packing-ring placed between its stationary and running parts and provided with detachable means for preventing leakage between said parts.

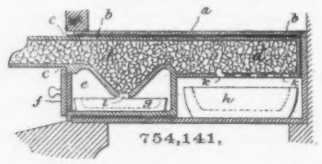
754,086. TRAVERSE QUADRANT.—Henry G. Nichols, Irvington, N. Y. An instrument comprising a rectangular frame, a slide mounted in said frame and operating parallel to one side thereof, a supplemental slide mounted in said frame and operating at right angles to the first-named slide and crossing the same, a quadrant arranged in one corner of said frame, a radial arm operating in connection with said quadrant and in operative connection with said slides and means for securing said radial arm and slides in any position.

754,095. GAS-FIRED BOILER.—Axel Sahlin, Millom, England. The combination with a blast-furnace, and a boiler-furnace, of a combustion-chamber

connecting the blast-furnace and the boiler-furnace, and comprising a portable circular metallic shell having a central gas-inlet at its top, radial inlets in its sides, and an escape-opening near the bottom below the radial air-inlets, fire-bricks forming an interior lining for the shell, valves for the radial air-inlets, a downwardly-seating valve for controlling the communication between the blast-furnace and the combustion-chamber, a seat for the valve provided with an annular space, and a door above the valve to permit access to said valve.

754,114. PROCESS OF PREPARING ELECTRODES.—George J. Atkins, Tottenham, England. For preventing the disintegration of carbon or other analogous electrodes of electrolytic or the like apparatus, the process which consists in saturating the material of such electrode with an oxidizable oil impermeable to the electrolyte.

754,141. PROCESS OF OBTAINING ZINC.—Evan H. Hopkins, South Kensington, London, England. A process of obtaining zinc from substances con-



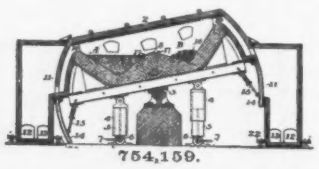
754,141.

taining it in a metallic state which consists of subjecting the substances to heat, excluding air and the heating-flame therefrom, and in conveying the zinc-vapors into and condensing all of them in a mass of heated carbon from which air is excluded.

754,147. APPARATUS FOR ELECTRICAL PRODUCTION OF NITROGEN OR OTHER COMPOUNDS.—Josef von Kowalski and Ignaz Moscicki, Freiburg, Switzerland. The combination, with an electric circuit and a plurality of pairs of electrodes arranged in said circuit in parallel, of a plurality of condensers arranged in parallel, each condenser being in series with its respective pair of electrodes, and means for supplying alternating current to the circuit.

754,154. PROCESS OF MANUFACTURING STEEL.—Otto Massenez, Wiesbaden, Germany. A process of manufacturing steel from chromiferous pig-iron in the reverberatory furnace which consists in melting the iron, forming in contact therewith a slag capable of dissolving chromic oxide, and adding a flux capable of counteracting the stiffening action of chromic oxide upon the slag.

754,159. METHOD OF TREATING ORES, MATTES, ETC.—John A. Potter, New York, N. Y. A method of treating metal and metal-bearing materials, consisting in forming a molten metallic bath upon one portion of a furnace-hearth, preheating a separate charge of solid materials upon



754,159.

another portion of the furnace-hearth, pouring the molten bath over the solid material, preheating another charge of solid material upon that portion of the hearth from which the molten bath was poured, and then pouring said bath back upon said subsequent charge of solid material and so continuing.

754,162. BLOWING-ENGINE.—Edwin Reynolds, Milwaukee, Wis. In combination with a chambered cylinder-head, a valve-seat formed thereon; a fixed stem extending down toward said seat; a valve mounted and movable upon said stem toward and from the seat; a tube mounted within the stem and bearing upon the inner face of the valve at one end; a plug fitting within the upper end of the stem; and a spring interposed between the lower closed end of the tube and the lower end of the plug.

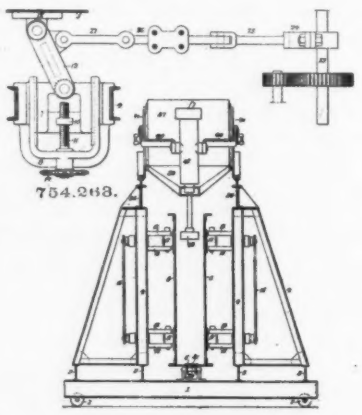
754,199. ROASTING-FURNACE.—Sanford D. Craig, Guy E. Kelly and William Turner, Laharpe, Kan. A roasting-furnace comprising a long casing having a downwardly-inclined floor, a series of arched roof-plates arranged at different horizontal planes, a flue leading to an uptake, certain of said plates forming the bottom walls of said flue, an agitator, and means for causing said agitator to move through the furnace.

754,229. CONVEYOR.—Thomas McDonald and Willis McKee, Youngstown, Ohio. In a conveyor, a fixed frame having a set of fixed supports, a movable frame having a set of movable supports, and means for effecting a curved movement of the movable frame and its supports for the purpose of giving a positive forward motion to the material being conveyed.

754,232. WOOD-DISTILLATION APPARATUS.—Charles M. Palmer, New London, N. C. In an apparatus for distilling wood, etc., the combination of a retort, a transverse partition or grate therein, a condenser, a pipe leading from the upper part of the retort to the condenser and having a trap intermediate the condenser and retort, and a pipe leading upwardly and directly conecting said trap, and with the retort below the grating.

754,262. PROCESS OF CLEANSING AND IMPROVING THE QUALITY OF IRON OR STEEL.—Frederick C. Weber, Chicago, Ill. A process of cleansing of oxygen slags, and occluded nitrogen and improving the quality of iron and steel in one operation, which consists in adding to the to-be-treated molten metal soluble binary metallic borides decomposable in solution under heat furnishing nascent atoms for cleansing the metal, and introducing into the metal when in a molten state alloys of iron with the basic metal of the particular borid used.

754,263. MACHINE FOR CHARGING COKE-OVENS.—Samuel T. Wellman, Charles H. Wellman, John W. Seaver and Thomas R. Morgan, Cleveland, Ohio, assignors to the Wellman-Seaver-



754,263.

Morgan Company, Cleveland, Ohio. In a coke-oven-charging machine, a hopper with sides adjustable from and toward each other, slides carrying an adjustable side of the hopper and laterally adjustable upon the frame of the machine, and means for effecting simultaneous adjustment of all of said slides.

754,265. MATCH COMPOSITION.—John A. Wendel, Milwaukee, Wis. A composition of matter consisting of potassium chlorate, sulphide of antimony, lead nitrate, amorphous phosphorus, vegetable carbon, bichromate of potash, and a binding agent.

754,268. MINE-SHAFT DOOR.—John Wineland, Athens, Ill., assignor of three-fourths to George, Seth and John Frederick Wineland, Athens, Ill. In a door for closing elevator-shafts, the combination with a structural framework, of swinging door-sections hinged to said framework, a crank-arm fixed to each of said door-sections, pivoted levers having a pin-and-slot connection with said crank-arms at one end and having a pin-and-slot connection with a vertically-reciprocating bracket at their opposite ends, and means actuated by the raising or lowering of a car in said shaft to actuate said levers and open or close said door-sections.

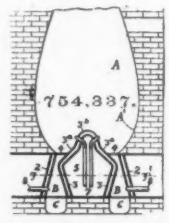
754,272. REVERSING-VALVE FOR REGENERATIVE FURNACES, ETC.—Charles G. Atha, Patrick, Scotland, assignor of one-half to William Beardmore & Company, Limited, Glasgow, Scotland. Improvements in and connected with reversing-valves, comprising, in combination, a water-seal bed-plate, ports therein, a stationary casing fitted thereto, rails formed with level and sloping portions, a frame having wheels adapted to run on the rails, a reversing-valve detachably fixed to the frame and working over the ports, an operating-shaft outside the casing, and means for operating the frame and valve from such shaft.

754,301. MANUFACTURE OF HARDENED-STEEL PROJECTILES OR OTHER ARTICLES.—Robert A. Hadfield, Sheffield, England. A method of hardening nickel-chromium-steel articles, which consists in heat-treating the article to raise the temperature thereof to about 900° C. and upward, and thereafter subjecting such heated article to the direct action of a blast or current of air.

754,325. WIRE-SOLDER-ROLLING MACHINE.—Augustus Lotz, San Francisco, Cal., assignor to Pacific Metal Works of San Francisco, Cal. In a machine of the class described, the combination of two peripherally-grooved rollers approximately tangential to each other, a guide for the wire on the entrance side of the rollers, and a trimmer mounted at the delivery side of the rollers, said guide and trimmer having their adjacent ends shaped to enable them to be inserted from opposite sides well in between the disks.

754,334 and 754,335. PORTABLE CONVEYOR.—William L. McCabe, Seattle, Wash. The combination with a suitable framework, of brackets mounted thereupon, a shaft rotatably supported by said brackets, a roller carried by said shaft, axles extending outwadly from each of said brackets and having ball-bearing mountings therein, rollers revoluby carried upon said axles, and means for moving the same from a horizontal to a diagonal plane.

754,337. BLAST-FURNACE.—John W. Pack, Berkeley, Cal. The combination in a furnace having a shaft and crucible, and an exterior water-jacket, of an interior hollow water-jacket the outer walls of



754,337.

which are spaced from the inner walls of said exterior jacket, said interior jacket having its upper portion converging and entering the lower part of the stack whereby said converging portion supports and arrets the ore passing from the furnace.

754,351. DUMP-CAR.—John Shelton, Denver, Colo. In a dump-car, a body-bolster adapted to rest upon the truck-bolster and extending upwardly through the center of the car-body and then laterally to the side sills of the car-body, and dump-doors hinged in position to swing upwardly against the outer portions of the body-bolster.

754,390. SORTING-MACHINE.—John Riddlebaugh, Sharpsburg, Pa., assignor to Lutz & Schramm Company, Allegheny, Pa. A sorting-machine, comprising a plurality of pairs of rolls arranged in vertical alignment and in planes having a common inclination, the rolls of the respective pairs being spaced apart with the spaces decreasing in width from the upper pair of rolls, a hopper arranged adjacent one end of the upper pair of rolls, and a separate delivering means for the respective pairs of rolls arranged at the opposite ends thereof.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week Ending February 13, 1904.

8,355 of 1903. AIR REHEATER.—Z. W. Daw, London, and J. Richardson, Lincoln. A furnace for reheating compresed air between the compressor and the drill.

23,919 of 1903. PURIFYING ALUMINA.—L. R. Keogh and B. Broughton, Hamilton, Ontario. Passing steam through a pulp made of sulphate of alumina and common salt, thus producing alumina, sodium, sulphate and hydrochloric acid.

27,248 of 1903. LOCKING MINERS' LAMPS.—L. N. Williams, Aberdare. Improved methods of locking miners' safety lamps by means of a lead plug squeezed upon both sides of a locking tongue.

SPECIAL CORRESPONDENCE.

Denver. March 10.

(From Our Special Correspondent.)

Martial law in Telluride was abrogated on March 11, when a banquet was given to Capt. Bulkley Wells, commanding officer of the local militia and manager of the Smuggler properties, in token of the service he has rendered to mining interests and to the State, under circumstances always trying and fraught with no little danger. Mr. Wells is the successor of Mr. Arthur L. Collins, who was murdered under circumstances that indicated the Western Federation of Miners was implicated. San Miguel county has been under military rule for two months.

At Cripple Creek the local Mine Owners' and Operators' Association on March 10 issued a statement to the non-union miners of the district and to the citizens of Teller county, which called attention to the fact that the dominating element within the Western Federation of Miners is composed of a small but powerful clique, who advocate and actually perpetrate acts of assassination, arson and dynamiting to accomplish their end, while by far the larger majority of miners within the union and outside of it are decent and law-abiding citizens; and the avowed purpose of the Mine Owners' and Operators' Association is to drive the disturbing and dangerous element of the Western Federation of Miners from the district and secure the election of public officers who will stand for law and order on all occasions.

The Association intends to establish a central bureau of employment which shall receive and act upon all applications for work in all the mines connected with it. This method will secure good, steady employment for good workmen and will throw out all those who are in harmony with the unlawful methods adopted by the Western Federation of Miners on so many occasions.

San Francisco. March 9.

(From Our Special Correspondent.)

The officers of the corps of engineers, United States Army, who constitute the California Debris Commission and have the regulation of hydraulic mining in the basins of the Sacramento and San Joaquin rivers, have just formulated rules which are of interest to anybody "using water under pressure through a nozzle against a bank of earth, gravel or similar material thus eroding the bank." The Commission requires in all cases that a license or written permission be obtained before hydraulic mining in the region named is legal. These licenses will not be issued unless all the requirements as to erection of suitable restraining works are fulfilled, and licenses granted may be revoked or suspended for failure to properly maintain the barriers or failure to make reports, when asked, to the commission. The licenses are not transferable and are valid only for special mines or persons. The sites proposed for restraining works are visited and authority to construct dams is given with the commission's specifications. Any dam built before such authorization is at builder's risk and may not be accepted. Any variation of location or character of work may also cause rejection of the dam. When the authorized dam is finished inspection is made, and if satisfactory a revocable license is granted, until which time it is illegal to mine. The owners or managers are required to report once monthly on blanks furnished for the purpose. In case of accident affecting efficiency of the dam, work must stop and the commission must be informed. When a dam becomes full of debris it should be raised, and permission for this must be obtained and the completed work is subject to inspection. Dams must be kept water tight and a pool at least 2 ft. deep must be maintained as a settling basin above each dam while mining is in progress. Names of mines must not be changed without notice being given. No charges or fees of any kind are required or allowed, all expenses of inspection being borne by the United States. Delay in making application may result in loss of a season's work, as many mines are almost inaccessible in winter, and applications for licenses must be made early in the season. The office of the California Debris Commission is at No. 96 Flood building, San Francisco, and Capt. Wm. M. Harts is secretary.

The rules are very simple, but many mines remain closed down owing to owners being unable to fulfil the requirements with regard to the construction of the dams, as the specifications of the engineers may call for too costly a dam. Speaking generally, the commission usually grants permits wherever it can see its way clearly to do so without possible danger to the other interests involved.

A number of men are at work at the Rawhide mine, Tuolumne county, but the strike is still on. When the United States Marshal went up there from San Francisco with deputies he could only find 13 men out of 100 on whom to serve papers. Since then Capt. W. A. Nevills, owner of the Rawhide and App mines, has appealed to the Governor for troops to quell disorder among the strikers, but the sheriff reported that everything was quiet and that pumps and hoists were operated with no interference except intercepting and arguing with men going to work. The demands of the Miners' Union were for recognition of the union; $3 per 8-hour day; the discharge of all non-union men and of Superintendent Burke, and men to board where they please.

At the Midas mine, Shasta county, the pumps are running, but other work is suspended owing to the strike. L. A. MacIntosh says he would rather keep the mine closed ten years than submit to the unreasonable demands of the union. Many of the miners have left the camp.

The Italian quarry-men at the Portland cement works, Napa county, have gone out on strike, demanding a rate of 20c. per hour.

A bill has been introduced in Congress appropriating $500,000 for the debris restraining barriers on the rivers in this State to supplement the work already done. The first high water this winter carried away part of the crib work for the foundation of the dams at Daguerre Point and the freshets of the past week have carried away a lot more. The damage is not irreparable, but is discouraging.

Harrison gulch, in Shasta county, where the Midas mine is, is in a ferment over titles. Miners who claimed the ground on which the town is situated is mineral had a contest with the town site claimants and won. Then three tenants jumped the claim, alleging that the owners had not done assessment work, and a suit brought to quiet title is pending. The miners have brought suit for ejectment against the townsite people and sue also for back rent of the ground.

The National Oil & Transportation Co. has asked Monterey county for a franchise for an oil pipe line from the Coalinga oil fields, Fresno county, to tide water at Moss Landing, on the Pacific ocean. Coalinga district is now producing about 20,000 bbls. of oil per day, which oil is carried to tide water on San Francisco bay by rail and by the Standard pipe line.

Geo. M. Pinney, the mining promotor, has filed a petition in bankruptcy with assets placed at $37,000 and liabilities at $93,128. The assets consist mainly of stocks in mining companies and certain claims for commission on sales of mines.

Several new lines of railroad are about to be built, one a short line from Smart station on the Central Pacific line into Fall Creek, Nevada county, to tap a timber belt in Placer and Nevada counties. Part of the road is in operation, and it will eventually be built to Graniteville, where are several mines. Another company is to build an 80-mile road from Boca, Nevada county, into Sierra and Plumas counties, as far as Beckwith, and along Feather river and Spanish creek to Quincy. A branch will be run from near Beckwith to Indian Creek via Clover, Squaw and Last Chance valleys. This is in a mining region largely, with numerous active properties.

The rains continue and the ground at the placer mines is soft and easily moved. This will be a prosperous year for California gold mining, even though the rains came late.

The Eureka Lighting Co. is about to develop its water power rights on Trinity river. It will produce 6,000 h. p., and furnish electric power for the towns of Eureka and Arcata and supply mines along a route of some 60 miles.

Salt Lake men have taken an option on the properties at Fremont Peak, about 25 miles from Randsburg, Kern county, where is supposed to be a "mountain of decomposed quartz" and several million tons of ore in sight. Careful investigation is to be made before extensive work is undertaken.

The gold coinage at the United States Mint at San Francisco was the largest in its history, $21,580,000. There being about $63,000,000 on hand, it was decided to clean up a large lot at once.

Spokane. March 11.

(From Our Special Correspondent.)

The decision of the Supreme Court of the United States in the Spookum case, in which the plaintiff was K. J. Hanley and the defendants the Empire State-Idaho Co. (now absorbed into the Federal Mining & Smelting Co.), Charles Sweeny and F. Lewis Clark, of Spokane, apparently settles the case in Mr. Hanley's favor. The defendants, represented by George Turner and W. B. Heyburn, applied for a writ of certiorari before the Supreme Court of the United States, but failed to get it. Mr. Hanley in the lower courts received a judgment of $259,000 against the Empire State Co. In addition he gets interest amounting to $37,000 and other items which make the total amount of the judgment about $400,000. He is also declared to be an eighth owner in the Skookum mine, reported the richest claim in the Empire State-Idaho group at Wardner, Idaho.

The judgment is against the Empire State-Idaho Co., and does not lie against Messrs. Clark and Sweeny. The history of the case is as follows. In 1896 Mr. Hanley was associated with Messrs. Clark and Sweeny in the Chemung Mining Co. at Wardner, and bought an eighth interest in the Skookum, then a mere prospect near the Bunker Hill and Sullivan group. Messrs. Clark and Sweeny secured other interests in the Skookum, and got an option on Mr. Hanley's share, and also on some stock in the Chemung Co., the deeds to which were put in escrow. Mr. Hanley claims that while his back was turned Messrs. Clark and Sweeny put the deed to the eighth interest in the envelope, and subsequently got possession of it by fraud. He brought suit to have the deed restored to him and demanded an accounting.

Dr. Wilbur A. Hendryx, inventor of the Hendryx agitator for the cyanide process, announces that he has made an extraction of 83.03% of all the gold and silver values in low grade Mountain Lion ore. He wanted the ore ground to 80 mesh, but 11% of the pulp was coarser than that. The typical low grade rock of the mine runs perhaps $10, in a proportion of 5 or 10 oz. of silver to one of gold. During the tests 98 tons of ore were treated. Dr. Hendryx thinks six hours is ample to treat the ore. The Dewey Mining Co. in Idaho county, Idaho, has contracted for a 100-ton Hendryx agitator, and should have it running in 90 days. Dr. Hendryx lays great stress on fine grinding, but estimates that it should not cost more than $1.25 a ton to crush Mountain Iron ore to 80 mesh. The total cost of milling it, he figures, should not exceed $2 a ton. The solution of cyanide used ran .99 lb. of cyanide per ton of ore.

In the Coeur d'Alenes the low-grade ores run about 10% in lead and from 5 to 10 oz. in silver. The mills have been saving only about 80% of the total values. W. Clayton Miller, assistant general manager of the Federal Mining & Smelting Co., and Thomas Greenough, manager of the Morning mine at Mullan, Idaho, are putting in Wilfley tables to save the slimes. The results are looked forward to with considerable interest.

Jacob N. Rice, who has been fighting R. M. Sherman in the State Superior Court for half an interest in Mr. Sherman's stock of the American Eagle Consolidated Mining Co., has lost. He alleged that he and Mr. Sherman were in a general partnership agreement covering all of their mining operations.

Patrick Clark and Major B. C. Kingsbury, of Spokane, who are operating in Goldfield, the new camp near Tonopah, Nev., have secured the G. A. H. claim there.

Victoria. March 8.

(From Our Special Correspondent.)

Boundary District.—Steps are being taken to incorporate a company to acquire the Athelstan and Jackpot claims in Wellington camp. A company has also been recently formed in Chicago with a capital of $500,000 to acquire the Nellie Cotton group of claims in Phoenix camp. The British Columbia Copper Co. has bonded the Bruce group of five claims near Midway. The Granby Co. is reported working on plans for increasing the capacity of its smelter plant at Grand Forks from 2,100 tons to 4,800 tons a day.

Coast Districts.—A 25-ton plant, utilizing the new De Keyser electric-cyanide amalgamation process, has been set up at Vancouver.

Lardeau.—Ten stamps are to be added to the Oyster-Criterion mill at Camborne. The Great Northern Mines propose to install a 40-stamp mill at the Lucky Jack. The tunnel on the latter claim is now in 320 ft.

Northwest Kootenay District.—The New Imperial Mines, Ltd., has just been formed with a capital of $100,000 to acquire the Imperial group of claims on the Illecillewaet river, 20 miles north of Albert Canyon. The claims have been partly developed, and the ore carries gold, silver and copper, particularly silver.

Slocan District.—The silver-lead mine operators at a conference in Nelson last week discussed the situation. Under the Dominion lead bounty the mine owners are entitled to a subsidy of $15 a ton on lead produced and smelted in Canada, provided production does not exceed 33,333 tons per annum. The Canadian smelters, it is claimed, charge a higher rate than American smelters, who are now ready to bid for this ore, while the St. Eugene mine at Moyie, East Kootenay, if worked to its full capacity can produce 30,000 tons per annum, and so worked the smaller mines would be shut out from the bounty. It is thought that the lead miners may ask the Government to relax the condition requiring lead ores to be smelted in Canada.

Reports from Slocan City division are satisfactory. The necessary money has been secured by the company owning the Howard Fraction claim to pay all liabilities and have enough to continue work. The force on the Fisher Maiden has been increased; the lessees of the Black Prince have encountered 14 in. of exceptionally high-grade ore. The Ottawa has shipped two carloads averaging 250 oz. silver.

San Luis Potosi. March 9.

(From Our Special Correspondent.)

It is understood in Chihuahua that the owners of the Rosario mine are suing Chas. W. Clark, Frank L. Sizer, and E. L. Whittemore, of Butte, Mont., for $500,000 gold for breach of contract. Clark, Sizer and Whittemore had an option, spent considerable money in exploration, and quit. Now the owners are apparently trying to force them to take a property they do not want. Near Terrazas, Chihuahua, the New England Mining Co., and the Massico Mining Co., two Connecticut companies, have started sinking shafts on the San Vicente and Massico properties, under the superintendence of G. W. Boyce. In the Guazapares district, Messrs. F. E. Parrish and Fred. Howard, of St. Louis, Mo., have bought for $400,000, Mexican, several gold and silver properties, and will start work under the management of John R. Harbottle. At Parral an English company has taken an option on the Refugio of Angel Garcia at $3,000,000, Mexican.

In San Luis Potosi, the National Metallurgical Co. is offering for sale $500,000, Mexican money, of bonds, to raise money for the erection of a 300-ton smelter at Matehuala.

In Sonora, the Nogales Copper Co., a Chicago company, under the management of C. M. Thomas, with F. N. Cox as superintendent, reports an excellent showing on the Cerro Prieto, recently purchased by the company in the Magdalena district at $600,000, Mexican. Philadelphia men are said to have furnished capital for continuing the development work of the Yerkes Gold Mining & Milling Co., at El Cajon de Amarillas, in the Altar district, and a 20-stamp mill will soon be started, under the direction of Dr. Underwood, of Boston. The Ruby Gold & Copper Co., at La Batamote, C. D. Davenport manager, operating the Maria, Magistral, Los Tajos and Los Angeles, is producing 50 tons a day and treating the ore in the furnace recently finished. Fuel is from the San Marcial coal fields, 18 miles distant. The Cieneguita, examined by Arthur Hendy, is said to have 16 ft. of $200 ore, with 100 men at work; the 125-ton smelter at Toledo, about 12 miles south of Soyope, is nearing completion; the Trinidad mine has started work; the Luckey Tiger is reported to have 1,000,000 tons of ore blocked out. The Union Iron Works is believed to have the order for $225,000, gold, worth of machinery for the Greene Consolidated Gold Placer Mining Co., for work on the Santo Domingo and San Miguel rivers.

In Queretaro, the United Mining & Development Co., of America, has bought, through O. T. Braniff & Co., of Mexico, on the report of E. G. Spilsbury, of New York, the El Doctor and Maconi mines, in the Maconi district, for which the company is to pay to the Beaurang family in the next two years $2,000,000, gold. Included in the sale are four smelting and refining works, 20 miles square of timber lands, and excellent water rights. The company will erect a 500-h. p. power plant on one of the water rights, build about 35 kilometers of narrow gauge road, and put in a 150-ton concentrator to handle the low grade ores.

Johannesburg. Feb. 14.

(From Our Special Correspondent.)

The outbreak of hostilities between Russia and Japan caused regret here, on account of possible interference with the scheme of importing Chinese labor for the mines, and prices of all stocks were depressed for a few days. The Labor Importation ordinance is now law, so far as this colony is concerned, and only requires the sanction of the home government. No time will be lost in getting it into operation. Meanwhile the native labor supply continues unsatisfactory. More laborers left for their homes last month than came to the mines. A first installment of natives from Damaraland, on the coast of West Africa, arrived here recently. It is highly improbable, however, that the labor supply will be much augmented from that region soon, as no one understands the Damara language. These Damara Land natives are good specimens physically, and in time will become efficient laborers. They sign for two years' service, a distinct improvement over the six-month periods of many of the other Kaffirs.

Things are rather stagnant here now, but after months of waiting we are becoming somewhat accustomed to stagnation. Many are tired of waiting for the good times and have gone off to try their fortunes in Uganda, near the east coast of Africa, which promises much to the industrious colonist. Land is offered on very liberal terms, and many young men will try their hand at farming or cattle raising. Johannesburg is now a bad place for men whose patience is very short and merely fortune seekers, as years of hard, steady work are necessary for advancement.

Prospecting in the eastern and western sections is going ahead vigorously, with numbers of diamond drills at work. On the western section efforts have been made for a long time to find the Randfontein leader, a small auriferous stratum, by bores 2,430 ft. from the outcrop. The formation is steep, about 60° to 65°, and unfortunately this dip is maintained in depth. Considerable difficulty has been experienced, therefore, in keeping the holes vertical. A bore started in June, 1899, was sunk vertically 2,018 ft. After the war, in June, 1903, an attempt was made to go deeper, but it had to be abandoned, leaving 550 ft. of rods and a rimming bit in the hole. On January 12, 1904, the second bore hole reached a depth of 4,727 ft., and will be carried to 5,000 ft. On account of the steep dip there must be a considerable deviation from the vertical. Probably it would have been better had the bore been put in so as to go down perpendicular to the strata. As there is lots of financial backing, the attempt to find this reef will not be given up. This mine will strike the reef over 4,000 ft. vertical depth.

There is a strong rumor that the Sheba mine, in the Barberton district, is on its last legs. The grade has fallen, expenses are high, native labor is scarce. The mine has done poorly for a long time, but there was hope that things would improve.

Diamond mines and diamond prospects are still much in demand. The success of the Premier mine (Pretoria district) continues. The shares of these schemes, many of which are "wild-cats *in excelsis*," fluctuate greatly from £30 to £200 being the figures for the shares of one diamond syndicate.

The writer once mentioned the doings of the Sutherland Reef Co., a gold mine in the Murchison range district, Transvaal. Its prospects seem bright, it having 10,000 tons of ore developed on a reef recently discovered. The general averages are 53.8 in. of reef, with a value of 11.82 dwt. A distinct success on the part of the Sutherland Reef Co. would go far to advance a district which has had a bad name for many years.

LANE CARTER.

Melbourne.

(From Our Special Correspondent.)

The bucket dredging industry is extending, and in the Bright district only one dredge is not on the dividend paying list. The farmers, however, are up in arms at the pollution of the waters of rivers by the sludge. A still more serious matter is the filling of the big holes in the rivers. These hold water when the rest of the streams run dry, and as the sympathy of the Legislature is with the farmer as a permanent settler, the dredging industry may receive a serious setback.

The Coal Miners' Association of the State has been in conflict with the employers for over a year, and the pits are being gradually manned from outside the union ranks. Large contributions, however, are coming in to the association for co-unionists in other parts of the Commonwealth, so their leaders have decided to start a pit on the co-operative plan. The State will grant leases of the land necessary. This development of unionism will be watched with interest. It is a legitimate enterprise and the right way of settling labor disputes.

Clifton. March 10.

(From Our Special Correspondent.)

The Shannon Copper Co. is steadily enlarging its operations in mines and smelter. A very rich vein of carbonate ore was discovered recently on Shannon hill, while grading for a new building. Some of the ore runs as high as 20% copper. The smelter below Clifton produced 500 tons of copper during February, shipments in the same period amounting to 511 tons. On March 7 the principal mine produced 664 tons of ore averaging 6% copper. The concentrating and smelting plant are to be enlarged, and a converter plant is to be erected which will enable the company to ship its product in the form of pig copper.

The Colorado mine of the Arizona Copper Co. is producing high-grade ore from the new shaft. The shaft is down to the 400-ft. level, but it is to be sunk another 100 ft.

The New England Consolidated Mining Co. intends to erect a smelter a few miles above Clifton near the San Francisco river. The company has a large quantity of ore in stock ready for treatment.

The Detroit Copper Mining Co. will enlarge its 650-ton mill to handle 1,000 tons daily, and enlarge the smelter. A new steel power house 260 by 64 ft. is being erected, also new coke and ore bins. A second furnace of the same size as the one now in operation (264 by 42 in.) is to be built. The larger mill will enable the company to increase its production of copper without adding to the burden of the smelter.

The importance of the new coal discovery, 3 miles southeast of Morenci, which has been described in glowing terms in local papers, can hardly be estimated as yet, although the geological conditions do not warrant the expectation of finding valuable coal in this district. It is true that sedimentary rocks of Paleozoic and more recent ages occur, but they are not in sufficient force to contain coal seams of any size. The discovery claim is in shales containing more or less bituminous matter.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. Philip Cross, of Denver, is visiting New York.

Mr. J. H. Curle has returned to London from eastern Siberia.

Mr. E. J. Roberts is manager of the Federal Smelting Company.

Mr. Henry F. Lefevre has left New York on professional business in northern Mexico.

Mr. A. H. Fay, of Cananea, Mex., recently visited the Clifton, Ariz., copper district.

Mr. Reginald W. Petre, of Baltimore, is examining mines near Monterey and Zacatecas, Mexico.

Mr. V. P. Strange, of Salt Lake City, Utah, recently examined properties at Goldfield, Nevada.

Mr. Stanley H. Pearce has returned to Magdalena, in Sonora, Mexico, after a visit to Denver.

Mr. Jas. W. Abbott, of Denver, has been at Boston, and is now going to Dahlonega, Georgia.

Mr. James W. Neill is acting as consulting engineer to Mr. F. Augustus Heinze, at Butte, Montana.

Mr. Wm. F. Fisher, of W. P. Bonbright & Co., returned to London by the *Lucania* on March 12.

Mr. S. Herbert Cox, of the firm of Bainbridge, Seymour & Co., is examining gold mines in Burmah.

Mr. H. Ross Skinner has been elected president of the Association of Mine Managers of the Transvaal.

Mr. E. J. Schmitz has recently returned to New York from Cuba, where he examined asphaltum deposits.

Mr. Geo. J. Bancroft, of Denver, is at Tonopah, Nevada, and will proceed from there to Vancouver Island.

Mr. W. Ziegler, of Philipsburg, Mont., is now superintendent of the mines of the Ohio Copper Co., Bingham, Utah.

Mr. William Campbell has been appointed instructor in metallurgy at the School of Mines, of Columbia University.

Mr. L. D. Godshall is on his way back to Denver after a trip through the Arizona and Mexican copper districts.

Mr. Walton E. Dowlen arrived from London by the *Kaiser Wilhelm II* and is now examining mines at Butte, Montana.

Mr. C. W. Hayes, of the United States Geological Survey, is giving a course of lectures at Johns Hopkins University.

Mr. J. C. Branner, professor of geology at Stanford University, California, has gone to Europe on a year's vacation.

Mr. Cortlandt E. Palmer is making a tour of inspection among mines of the Guggenheim Exploration Co. in Mexico.

Mr. J. Parke Channing lectured on March 15 to the mining students at Harvard and the Institute of Technology, Boston.

Mr. F. L. Ransome, of the United States Geological Survey, has returned to Washington, from Cripple Creek, Colorado.

Mr. E. C. Voorheis, of the United States Assay Commission, has returned to Sutter Creek, Cal., from Philadelphia, Pa.

Mr. A. H. Danforth, of Lead, S. D., has resigned as manager of the Hidden Fortune Gold Mining Co., and has gone to Colorado.

Mr. Homer Wilson, of San Francisco, Cal., is in New York in the interest of the Wildman-Mahoney mines, of Sutter Creek, California.

Mr. S. F. Parrish, manager of the Le Roi mine at Rossland, B. C., has been seriously ill at Spokane, Wash., following an operation.

Mr. C. E. Mills, general superintendent of the Detroit Copper Mining Co., has returned to Morenci, Ariz., after several weeks' absence.

Mr. Frank H. Lathrop, of Salt Lake City, was in Calumet, Mich., recently in the interest of the Tonopah-Belcher Co., of Lone Mountain, Nevada.

Capt. James Wilcox, of Mass City, Mich., has been in Boston to attend a meeting of the directors of the Mass Consolidated Mining Company.

Mr. Donald R. Morgan, general superintendent of mines for the Compania Metallurgica du Torreon, Mexico, has returned to Mexico from California.

Mr. W. H. Child, of Salt Lake City, is in the Lake Superior copper district, in the interest of the Sheba Gold Mining Co., of Humboldt county, Nevada.

Mr. J. M. Hillyer has been examining the Compio silver mine and adjacent gold claims near Guadalupe de los Reyes, Mex., and is now at Panuco, Sinaloa, Mexico.

Mr. Max J. Welch, smelter engineer, who has been designing the new plant of the Old Dominion Co., has left Globe, on a trip through California and the Northwest.

Mr. E. S. Grierson, chief engineer at the Calumet & Hecla mine, at Calumet, Mich., has returned from a tour of the mining camps of Arizona, New Mexico and Utah.

Mr. C. Becker, of Denver, Colo., an assistant the past two years with the Guggenheim Exploration Co., has accepted the management of a copper mine in Sinaloa, Mexico.

Mr. Joseph F. Body, of Baltimore, is at Virginia Hot Springs, but will return shortly to Chihuahua, where he is general manager of the Arroyo Rico Mining Company.

Capt. John Penhall has been appointed manager of the Carn Brea and Tincroft mines to succeed Capt. White, resigned. Capt. Penhall has been, for many years, in charge of South Crofty mine.

Messrs. J. S. and R. J. Cary, president and vice-president, respectively, of the Mine & Smelter Supply Co., Denver, Colo., will hereafter look after their interests in Routt country, Colo., where they are interested in coal and other mining interests.

OBITUARY.

Ernest L. Wyckoff, president of the A. Wyckoff & Sons Co., of Elmira, N. Y., died at Elmira on March 3, after an operation for appendicitis. Mr. Wyckoff was born in 1852 in Elmira, where his father, Arcalous Wyckoff had begun the manufacture of chain pumps and wooden water pipe. After the death of his father in 1898, Mr. Wyckoff had personal supervision of the manufacture of the wooden water pipe, which had attained a wide reputation. He was a kindly, charitable man, and highly esteemed by the community in which he lived. He leaves a widow and three sons.

SOCIETY AND TECHNICAL SCHOOLS.

MONTANA SOCIETY OF ENGINEERS.—At the February meeting Alex. N. Winchell, Russell A. Wilson, Francis M. Kerr, Frank A. Jones and Lewis W. Wickes were elected members.

NEW YORK ACADEMY OF SCIENCES.—Mr. H. H. Wotherspoon will read a paper on 'The Utilization of Peat and Lignite' before the Section of Geology at the American Museum of Natural History on March 18.

ENGINEERS' CLUB OF PHILADELPHIA.—At the regular meeting on March 5 there were 100 members and visitors present. The topical discussion on "Conflagrations in Cities," opened by Dr. Henry Leffmann, was continued by Mr. William McDevitt. Messrs. Furber, Christie, Comfort, Quimby, Schumann and others also participated in the discussion.

PROVINCIAL MINING ASSOCIATION OF BRITISH COLUMBIA.—The second annual convention was held at Victoria recently, the sessions lasting five days. In his annual report Mr. John Keen, president, stated that the executive committee had met during the year at Victoria, Vancouver, Rossland and Kamloops, and submitted the resolutions, bearing on the mineral industry passed at these meetings.

A committee interviewed the Provincial Government and reported that it had received assurance that the Government would consider all recommendations made by the Association. A large number of resolutions were reaffirmed.

Mr. John Keen, of Kaslo, was re-elected president, Mr. John D. Hobson, general manager of the Consolidated Caribou Hydraulic Gold Mining Co., first vice-president, and Mr. Rowland Machin, of Victoria, second vice-president. An executive committee of 36 members was chosen, which later appointed Mr. E. Jacobs secretary, and Mr. H. Mortimer Lamb honorary treasurer and assistant secretary. It was decided to hold the next annual convention in Vancouver. Before the delegates left Victoria, Mr. James Dunsmuir placed a train at their disposal, to afford them an opportunity of visiting the Lenora, Tyee and Richard III. mines at Mount Sicker, about 40 miles from Victoria.

INDUSTRIAL.

The Link-Belt Engineering Co., Philadelphia, Pa., is to erect a brick pattern storage house, 40 by 96 ft., with fireproof partitions.

O'Brien & Rhoades, engineers and contractors, Denver, Colo., are drawing plans and specifications for a gravity system of water works and a sewer system for the town of Rocky Ford, Colorado.

The National Electric Co., successors to the Christensen Engineering Co., manufacturers of air brake and electrical machinery, has just moved its executive offices and engineering department to the new building at the works. The building is 200 by 66½ ft. Numerous extensions and improvements are being made in the shops.

The American Engineering & Reduction Co., Cleveland, O., has been formed with the following officers: Will Christy, president; C. H. Lane, vice-president; L. A. Smart, secretary; F. H. Townsend, treasurer. These, with J. R. Nutt and E. H. Wood, are directors. The company will place on the market, on a royalty or other basis, the Lane ore concentrator, formerly produced by the American Foundry & Machine Co., Ravenna, O.

William Jessop & Sons, Ltd., of Sheffield, report profits for the year amounting to £44,-314. A dividend of 6 shillings per share is declared. The report states that the equipment of the American works has been completed, and no funds in respect of capital expenditure have been drawn since August last. An interest was recently acquired in the firm of J. J. Saville & Co., steel and file manufacturers, of Triumph Works, Sheffield, and of Libau, in Russia.

The Power & Mining Machinery Co. reports the following recent sales: To the Relief Gold Mining Co., Phoenix, Ariz., the complete machinery and power equipment for a reduction plant, including a 7-ft. Lane slow-speed mill; Nova Scotia & Mexican Mining Co., Goldenville, N. S., miscellaneous equipment for a 40-stamp mill; Natividad mine, Oaxaca, Mexico, complete equipment for a 10-stamp mill; United States Reduction & Refining Co., Colorado Springs, Colo., large copper matting furnace. Several McCully gyratory crushers have also been disposed of.

The Canadian Engineering Co., it is reported, has purchased for $200,000 the plant and property of the defunct James Cooper Manufacturing Co., at Rockfield, near Montreal, Canada. This plant consists of five buildings and is said to be one of the best equipped plants in the Dominion for the manufacture of mining machinery. It is understood that the Canadian company is to manufacture the machinery for the Canadian Bullock Electric Manufacturing Co. R. W. Chaplin, of New York, formerly manager of the Ingersoll-Sergeant Drill Co., will be manager.

The Cauvery Falls electric power transmission plant, in India, is to be enlarged from 4,000 to 6,000 h. p., it is reported, to increase the supply to the Kolar goldfields. The new plant will consist of five units of direct-coupled turbines and generators, with one exciter set, of type identical with those in the old power house and of similar capacity, viz.: 1,250 h. p. and 720 kw. for turbines and generators respectively. There will be nine additional transformers in the step-up and the step-down transformer stations. The work will be carried out directly by the Mysore government. The main transmission line will carry a voltage of 35,000 volts. The power house itself is to be extended and a new forebay and three new section houses on the transmission line built. The total estimated cost of the extension is put at about $450,000. The plant and machinery will be supplied by the General Electric Co., New York; Escher, Wyss & Co., of Zurich, Switzerland, and Mechan & Sons, of Glasgow, Scotland. The Cauvery Falls plant is the largest of its description in the Far East.

The Westinghouse Electric Manufacturing Co. has been awarded a contract for an 8,000 k. w. power plant, to be erected in the machinery building at the St. Louis World's Fair. The steam engines will be furnished by the Westinghouse Machine Co., and the engineering and construction of the plant will be done by Westinghouse, Church, Kerr & Co. The plant will contain four units of 2,000 k. w. each. These will be 25-cycle, 3-phase, 6,600 volt generators, direct connected to Westinghouse Corliss engines. The efficiency guarantee is 96% at full load, 95% at ¾ load and 93% at ½ load. They will operate at continuous full load with not over 35° C., rise in temperature. The engines will be Westinghouse vertical, cross compound, condensing Corliss, running 83 revolutions per minute, rated at 2,800 h. p. with a maximum overload capacity of 5,200 h. p. The boilers in the Steam and Fuels building which will supply this plant are 16 in number, of 500 h. p. each, built by the Babcock & Wilcox Co. Besides the main units, there will be three 80-k. w. exciter units, direct connected to vertical cross-compound, condensing Westinghouse engines.

TRADE CATALOGUES.

The Universal Drafting Machine Co., of Cleveland, O., has devoted an excellent little catalogue to its Universal drafting machine, giving the details of its use, supplemented by some excellent illustrated examples. The machine practically consists of a graduated square having a parallel motion about the drawing board, and is said to effect a great saving in time.

"Hoists and Hoisting Machinery" is the title of catalogue No. 45 B., issued by Fairbanks, Morse & Co., and deserves special attention, owing to the valuable data which it contains on the class of machinery to which it is devoted, and also on account of the general make-up and creditable illustrations, which set out the facts stated more forcibly. The hoists shown are coupled with gas, gasoline, distillate or kerosene engines, which require the minimum of space.

Geo. G. Blackwell, Sons & Co., Ltd., of Liverpool, Eng., has issued a booklet and folder dealing with its alloys of oxides of chromium, aluminum and magnesium, and fluorspar for basic open-hearth furnace linings. The S. A. M. alloy, manufactured by the company, is given the center of the stage in this booklet.

The Winter screen for clay, sand, ore, etc., is the subject of an 8-page catalogue sent out by the United States Sanitary Co., Washington, D. C. This screen is designed to handle heavy crushed ore and size accurately. The usual description, supplemented with numerous illustrations and a price list of the screens are inserted in proper style.

Elevators and conveyors, designed for handling coarsely broken stone and ore, are taken up in a 4-page folder, issued by Hadfield's Steel Foundry Co., Ltd., of Sheffield, Eng., mentioning also the Heclon gyratory breakers, reciprocating breakers, revolving screens, etc. The company states that other elevators are also manufactured, including the link belt and rubber carrying belt. Upwards of 1,000 various styles and sizes of links used in these elevators are manufactured by the company in Hadfield's patent manganese steel. Conveyors for various uses are also mentioned, designs and other particulars of which the company will gladly furnish upon request.

GENERAL MINING NEWS.

Interstate Agreement of Bituminous Operators and Miners.—Owing largely to the exertions of Mr. John Mitchell, who sent out circular letters advising the miners to accept the terms offered by the operators at the recent convention in Indianapolis, it is stated that a majority of the miners have voted to accept the reduction in wages and will not strike.

Mineral Oil Exports.—In February the oil exports from the United States were: Crude, 8,564,720 gal.; naptha, 1,106,524 gal.; illuminating, 53,236,124 gal.; lubricating and paraffin, 6,607,956 gal.; residuum, 1,136,100 gal.; total, 70,651,424 gal., as against 68,866,613 gal. a year ago; showing an increase of 1,784,811 gallons.

ARIZONA.

MARICOPA COUNTY.

Arizona Reclamation Co.—G. H. Brewster, of Pasadena, has purchased the quarter interest held by Thomas Elder in this company, which is operating a new process cyanide plant on the slimes of the Old Vulture dump near Wickenburg.

White Tanks Mining Co.—The custom smelter at Wickenburg has been sold by Thomas Elder and associates to this company, which owns the Ford group of mines in the White Tanks mountains, southwest of Wickenburg.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Mossback.—This mine, in Silver Creek district, has been handled by S. M. Slocum, who has begun work. The vein is reported to be 14 ft. wide, carrying $9 gold to the ton.

Plata.—This mine, at Plata, has cut gold and copper ore on the 175-ft. level.

Redemption.—A new shaft has been started in this mine, at Chloride, down 18 ft. in a 2-ft. vein of ore carrying values in gold, silver and copper.

Stockton Hill Mining Co.—This company, at Stockton Hill, has work well under way for their new zinc plant. The metals in the ores are to be separated by the magnetic process.

Tennessee.—This mine, at Chloride, belonging to the Wallapai Mining Co., has suspended work pending a sale and transfer.

PINAL COUNTY.

(*From Our Special Correspondent.*)

Alice.—A vein of sulphide ore 8 ft. wide has been struck in the tunnel of this mine at Troy.

Copper Butte.—This mine, at Florence, which has recently been taken over by H. Whitburn and G. W. Wallace, of Duluth, Minn., is sinking a 2-compartment shaft.

Lampker & Hunstock.—This company, at Superior, is said to have sold its group of mines to W. Graichen for $30,000.

CALIFORNIA.

AMADOR COUNTY.

Argonaut Mining Co.—At this mine, Jackson, a station at the 1,950 ft. level is being cut. Two more stations will be cut below this before further sinking is done. There is considerable water to be handled at present.

Climax.—A recent crushing from this mine, P. B. Aiken, superintendent, ran $8 per ton. More stamps are to be added to the small mill in use.

Imperial.—This mine, on the P. King ranch, near Sutter Creek, is to be worked by F. O. Courtmarsh and others under bond.

Shenandoah.—This mine, near Plymouth, Sam'l K. Thornton, superintendent, has closed, owing to a short wood supply.

CALAVERAS COUNTY.

Nelson.—This mine, at Calaveritas, has cleaned up $6,000 after a 17 days' run.

Royal Consolidated.—In this mine, at Hodson, a streak of very rich ore has been developed in a new part of the property.

INYO COUNTY.

Panamint Valley.—At the Tuber mine the company made a final clean up and shipped a handsome bar of bullion. At Old Panamint, J. C. Curran is about to make a mill run on ore from the Curran claim. In Pleasant cañon, Geo. Montgomery has put men at work on the World Beater group and started the mill. At the Radcliff the company is about to put in a roaster. The Gold Crown Mining Co. will soon have their mill and tramway finished. At Redland cañon the Anna Barbara Mining Co. has just made a satisfactory clean-up. At Coyote cañon, where the rich strike was made a year ago, Thurman & Gray are working the Gold Spur mine, and samples across the 6-ft. ledge show $53 per ton gold. It is a free milling camp. At the same camp Goosline & Pickett have a fine prospect on the Admiral, the ore running about $120. In some places the ledge is 8 ft. wide. In the Argus range, at Millspaugh, they are about to start their mill. At Snow cañon the Golden Argus Co. is still working on its cross-cut. John Cyty has bonded two claims for $10,000. Phail & Chambers are developing the Empire gold mine. At Minetta, J. J. Gunn is shipping silver-lead ore and Kennedy & Miller are shipping a carload of high grade ore from the mine they are leasing. Foisis & Hick have taken a year's lease on a part of the Gunn mine. The Snow cañon section of the Argus range is reported to be a good place for leasing, which is a point for chloriders to note. Leasers have usually made money there in gold, silver and lead ores.

KERN COUNTY.

Bald Mountain and Eclipse.—Development work is being done in these claims at White River by C. B. Rogers. A two-compartment shaft now 80 ft. deep is being sunk on the Bald Mountain, and it will be continued to 300 ft. In the Eclipse the water has been pumped from the 400-ft. shaft and another 100 ft. will be sunk.

Diamond and Bright Star.—On the latter mine at White River the outlook is excellent and deeper sinking is being done. On the Diamond, D. B. James, superintendent, there is a two-stamp mill and work will shortly be resumed.

Ophir Tunnel.—S. J. Montgomery and D. J. McCormick have located this tunnel site eight miles northeast of Randsburg and will run a 200-ft. tunnel to work a 6-ft. ledge of silver-lead ore.

MARIPOSA COUNTY.

Champion.—This mine, between Coulterville and Pinon Blanco, is now under bond to a company who are developing it. They are only down 100 ft. thus far.

NEVADA COUNTY.

Brunswick.—This mine at Grass Valley will soon be in operation under C. H. Mallen. The past year the company has been troubled with the lower levels being flooded. The big new pumps are now reducing the water rapidly.

Eddy.—The new pay shoot met in the south workings of this mine is proving of great value. The strike is 150 ft. south of the shaft and the ore is of good quality. The mine is near Nevada City.

Green Mountain.—The decision in the suit of O'Brien *vs.* the Grass Valley Consolidated Mining Co., Grass Valley, involving title to this mine has been decided in favor of O'Brien, who

brought suit to quiet title. Mr. Labadie has resigned as superintendent and Mr. O'Brien is now in possession.

SAN DIEGO COUNTY.

Work has again commenced at the lithia mines at Pala, Frank Salmons superintendent. This is in accordance with recent settlement of legal difficulties.

The palagonite mine at Encinitas is now owned by Mrs. Margaret Standeford and J. F. Delgado, and extensive developments are planned.

Owens.—Operations at this mine, at Julian, have been resumed, with N. S. Large in charge. The old shaft is being pumped out, and when this is done a new shaft will be started. The mine is being worked under bond.

SHASTA COUNTY.

Gladstone.—The mine and mill of this property at French gulch, owned by the Hazel Mining Co., C. B. Jilson, superintendent, have resumed operations. An entire non-union crew of 80 Americans is employed and the output is 60 tons of ore daily. The plant is run by electricity.

SIERRA COUNTY.

Bigelow.—Eastern men are about to buy this mine at Sierra City from Marlin, Tautphaus & Broeckman, the present owners.

Port Wine Channel.—F. P. Roddy, of Downieville, has an option on the old Port Wine channel and has gone east to obtain capital to work it. The channel is extensive, and it is thought that $100,000 will be required to properly open it.

SISKIYOU COUNTY.

A new dredger is to be built at Garvey Bar, just above the mouth of Humbug creek. The Garvey is an extensive bar and below it are the Pacific, McConnell, Kanaka, Swiss Bar, Centennial, Fort Jones and other river claims, and above, claims at American, Bar Ash creek, etc., all rich.

The Chinese company which has been working the gravel deposits near the mouth of Seiad creek for over 25 years are now getting out rich dirt.

Fort Gough.—The Chicago company owning this mine, J. W. Martin, superintendent, will extend the ditch and flume this season.

John Bennet Quartz.—A rich strike has been made in this claim on Blue ridge. The mine is in the Black Bear region, near the old Last Chance mine.

TRINITY COUNTY.

Bully Choop.—This company, J. S. Stevenson, superintendent, will drive a new adit this season to open the vein at a depth of 800 ft. There is a 10-stamp and a Huntington mill on this property.

TUOLUMNE COUNTY.

Altadena.—At this mine near Columbia, sinking will be resumed as soon as the machinery is in place.

Black Oak.—In this property, at Soulsbyville, men are at work timbering the shaft. The mine is practically closed owing to a miners' strike.

Eureka.—This mine, near Jacksonville, recently bought by Thos. Corcoran, is to be fully developed this summer.

Golden West.—This mine, on the Comstock ranch, is to be started up again under Superintendent Frank McPherson.

Longfellow.—This mine, near Groveland, is about to put in a plant for using oil as fuel.

Santa Ysabel.—E. C. Loftus, the superintendent of this mine, is ordering hoisting machinery to work to 2,000 ft.

Soulsby.—Representatives of the purchasers now have charge of this old mine at Soulsbyville and are making plans for working it on a large scale. More stamps are to be added to the mill. H. L. Houston is in charge.

Starr King.—This property, on the East Belt, is in active operation again under Superintendant Chas. A. Holland. A new shoot of ore has been struck.

COLORADO.

CLEAR CREEK COUNTY.

Centurian.—Work is to resume at once on this tunnel property near Idaho Springs and a winze will be sunk on one of the ore streaks. A pump has been put in to handle the water. Fred L. Nye is manager.

Hudson.—Work has begun on this 60-ton mill near Idaho Springs. The building will be 60 by 130 ft.

Idaho Springs Mining & Reduction Co.—This mill is to resume shortly, it is reported, under J. J. May, manager.

K. R. S. Milling Co.—This company, under the direction of Strang Bros., has begun the erection of its mill for treating the tailings from the Newton and Jackson mills. The main building is to be 108 by 50 ft. The company intends to handle the tailings first from the Newton Annex, now being completed. The plant will be similar to that in operation below the Black Hawk mills. The tail race will be elevated directly into the upper end of the mill.

FREMONT COUNTY.

Bluff Springs Coal Co.—In sinking a shaft on the land of this company south of Florence, four strata of coal were exposed, it is reported, at a depth of less than 100 ft.

Rocky Mountain Smelter.—This smelter, idle for the last two years, was sold at public sale recently for $34,330 to Mrs. A. N. Kendall, of La Moille, Ia., who represents the majority of the stockholders in the purchase. The purchase may mean a reorganization of the company. Roasting furnaces will be added. The smelter is reported to have cost originally $350,000.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Alps.—A new vein has been opened east of the 800-ft. level or submarine shaft, assaying up to $194 per ton. The regular smelting ores from the 1,300-ft. workings run up to $250 to the ton in carload lots. James Williams, Nevadaville, is manager.

Gulch.—William Mitchell & Sons, of Central City, are going to install a steam hoisting plant and erect a larger shaft building at their mine in Lake district. They are down 280 ft. and shipping smelting ore running nearly $200 per ton for first-class, besides a fair second grade and milling ore.

Hillside Mining Co.—The Hamlet is working about 20 men on sub-leases, and between two and three cords are being shipped each day to local mills of a very fair grade. Smelting ores are shipped to Denver smelters in carload lots. W. H. Simonds, Central City, is manager.

Newfoundland.—Operations have been resumed at this property, on Gunnell hill, and as soon as the water is out an examination will be made of the lower workings to determine future operations. George W. Mabee, Sr., Central City, is in charge.

Old Town.—Roberts & Thomas, lessees in the 400 ft. workings of this property shipped during February 144 tons of concentrating ores which yielded $109 net per ton. George K. Kimball, Jr., Idaho Springs, is manager.

Wood.—Local lessees shipped 1,420 lb. of pitchblende ore, and an analysis show it to run better than 50% uranium, for which a cash price of $1.10 per pound will be paid in Denver. Drifting continues at a depth of 220 ft., and the lessees are running into more pitchblende ore. The Rockdale Mining Co., of New York, is the owner, and it is being worked by A. Christopher, of Central City, Colo. Besides the pitchblende ores the lessees have opened a streak of almost solid copper iron carrying values better than $100 to the ton.

LA PLATA COUNTY.

Neglected.—A rich strike is reported in this mine near Durango. Assays show $50 gold per ton.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Cloud City.—A new incline is being pushed from one of the lower levels to catch the ore body of the Midas and Penrose. From other parts of the mine about 50 tons of good iron is being shipped daily.

Coronado-Penrose.—The work of re-timbering the latter shaft is nearly completed, and sinking both of the shafts another lift each of 250 ft. will be started shortly. From the Coronado-Midas 250 tons of good ore are being shipped daily.

Ibex Mining Co.—This company will operate one shaft and a large amount of adjoining territory, while the remainder of the big combination is to be given up to lessees. This action has just been decided upon, and details have not been made public.

La Plata.—This mine in the Upper California gulch, is shipping 60 tons daily of a high grade lead-carbonate ore from the old part of the property.

Little Pittsburg.—The recent strike improves with work and the bins are now full of a first class grade of iron. A heavy shipment goes out this week.

Nil Desperandum.—Preliminary work has just begun on this Rock Hill claim with a view of working the Moffat shaft on Rock hill.

R. A. M.—A good body of sulphide ore has been opened by lessees which runs well in silver.

Reindeer.—Rock hill is shipping regularly, and the body of ore is increasing in tonnage and value.

LARIMER COUNTY.

National Mining & Milling Co.—This company was incorporated recently with a capitalization of $7,000,000 to build a 100-ton smelter at Pearl to turn out copper matte. The new company, it is also reported, will work some mining property near Pearl. Charles E. Knapp, of Encampment, Wyo., is said to be engineering the project.

MINERAL COUNTY.

Big Kanawha Co.—A slimes plant is to be built by this company, it is reported, and a number of retaining or check dams will be erected along Willow creek, below the Humphreys mill, near Creede, to hold the overflow and slimes from the mill, and as they fill up a plant of machinery will work them over.

SAN JUAN COUNTY.

Bavarian Gold Mining & Milling Co.—This company has let a contract to be run on the big crosscut tunnel near Howardsville, where it has a group of 10 claims. The company recently struck a streak of copper ore said to assay 20% copper with gold values. A contract has been let for a new 20-stamp mill, to be in operation by July 1. Louis Frisch is president.

New York-Brooklyn.—This group in Emporium gulch, near Chattanooga, is working a small force on development work. The ore is reported very good and increasing in value.

Yale-Brown Mines Co.—This company has acquired 37 claims, a millsite and tunnel site in the Red Mountain district and is pushing the work with a force of 16 men. The tunnel intersected the Argentum vein late last fall, 200 ft. below surface, exposing a good body of $18 mill rock. The company may install an air compressor plant this spring.

SAN MIGUEL COUNTY.

On March 15, according to a press despatch, between 60 and 75 members of the Telluride miners' union and sympathizers who had been deported but who returned when the militia were called away, were forcibly taken from their homes and boarding houses by 100 armed members of the Citizens' Alliance, put aboard a specially chartered train and deported to Ouray. The men were warned individually and collectively after they were forced into the two cars of the train never to return to Telluride. It appears that the decision to deport the unionists and their sympathizers was reached at a meeting of the alliance, when the strike situation was discussed. The meeting adjourned and the members went home, secured weapons and later met at a place previously agreed upon. Among those deported was Stewart Forbes, secretary of the miners' union.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Colorado Boss.—A new shaft-house and hoisting plant are being erected on the Russel and Sharpe lease on this property. The lessees have recently commenced sinking a shaft on the property.

Milwaukee Gold Mining Co.—This company has secured a lease on a portion of the Anaconda property and will at once begin development. Mr. Gilbert, of the Le Clair property, has charge.

Mt. Rosa Mining, Milling & Land Co.—This company is to be reorganized as the Mt. Rosa Mines & Land Co., and will take all the property of the old company. The reorganization is to legalize several minor points with regard to the incorporation. The company owns the mineral rights under the town site of Victor as well as other property.

Old Gold.—This company has just paid its first dividend of $10,000 from royalties paid by lessees. It is understood that the lease on the property expires soon. The property is on the west side of Beacon hill.

Stratton Estate.—It is again announced that the Gold and Globe hill property belonging to the estate is to be leased. At present, the Bull hill property will not be leased.

GEORGIA.

LUMKIN COUNTY.

McAfee-Lind Mining Co.—This company has completed its 10-stamp mill near Dahlonega, and has also installed a Dean pump which lifts water 220 ft. into a reservoir. A pipe-line has been built running from the reservoir to the giant, 300 ft. below. The property has a number of small veins, which yield a fair return in gold. While the work on the reservoir was going on, some ore has been taken out and hauled to the mill, but when the water is available, hydraulicking will begin, and the stuff washed out will be sluiced down to the stamp-mill. It is expected that some gold will be saved in the sluices, while the vein rock will be passed through the mill.

IDAHO.

BOISE COUNTY.

(From Our Special Correspondent.)

Iowa.—Albert Burch and Frederick Burbridge are the active managers of the Western Mining & Development Co., which now controls this old mine at Quartzburg. A. B. Campbell, of Finch & Campbell, Spokane, Wash., is financially concerned. The property will be put in working shape.

ELMORE COUNTY.

Franklin.—This Larson & Greenough property, at Pine, is reported yielding $16,000 a month in gold from the plates. The concentrates are being piled up. The mill is an old 10-stamp affair which is being run by the new management under a clause of the contract of purchase.

IDAHO COUNTY.

(From Our Special Correspondent.)

Ajax.—The mine is reported in good ore on the north side drift. Sinking will be resumed soon.

Atlas.—Sinking with two shifts is resumed, and a third shift will be added at once.

Buffalo Hump District.—There are 6½ ft. of snow on a level, or 3 ft. less than for the corresponding time last winter.

Del Rio.—Rails in the tunnel are being put in as fast as they arrive.

Dewey.—The mill has been running steadily all winter. The December and the January cleanups are reported to have been the best in months. About 40 lb. of bullion were sent out each month as the proceeds from 10 stamps.

Sunnyside.—The Burr Oak tunnel is in 1,000 ft. in granite and quartz stringers, and advancing 25 ft. per week with seven men. It is expected that the ore body will be reached in 200 ft. more.

Thunder Mountain Pearl.—This Pittsburg company has 19 claims on both sides of Holy Terror creek. Three tunnels have been driven, 100, 135 and 250 ft. long respectively. The principal tunnel will be driven 500 ft. this season.

SHOSHONE COUNTY.

Independence Consolidated Mining Co.—This company has paid the sheriff $12,153 and redeemed its properties which had been bid in March 3, 1903, to satisfy a judgment for a hardware bill of $10,153, rendered in March, 1901. Kennedy J. Hanley, of Skookum, and Tom Argyle, the principal stockholders in the company, made the payment. The group includes four claims in Hunter mining district, between the Morning and the Gold Hunter mines, north of Mullan.

INDIANA.

VIGO COUNTY.

(From Our Special Correspondent.)

Indiana Miners' Convention.—The annual convention of the Indiana Coal Miners was held in Terre Haute, March 8 and 9. The convention was brief, as owing to the operators and miners in the national conference not having reached an agreement, the state convention was unable to take up state matters.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Atlantic.—This mine produced 320.5 tons of mineral in February.

Baltic.—The February production was 329 tons of mineral, the result of 12 days' operations. The company has offered the men who have been on strike since February 15 wages of $60 a month for miners and $54 for trammers and timbermen. The men have voted to return to work, but await the action of the men at the other mines under the same management.

Calumet & Hecla.—It is estimated that the output was 3,200 tons of refined copper in February.

Champion.—The February production was 375 tons of mineral, secured from 12 days' operations. The men are still out on strike.

Elm River.—Cross-cutting west from the 525-ft. shaft continues. Only a few men are employed.

Franklin.—The production in February was 317 tons of mineral. Repairs to No. 5 shaft of the old mine are completed and rock shipments are now at the rate of 400 tons daily. Although it is a "scram" the old Franklin may continue to produce for 10 or 15 years.

Isle Royale Consolidated.—The February output is estimated at 75 tons of refined copper. Operations are confined to No. 2 shaft. One head at the mill is in commission, and rock shipments average 500 tons per day. About 150 men are employed and 16 drills are in use, three drifting and the remainder stoping. No decision regarding the final disposition of No. 1 shaft, recently gutted by fire, has been reached by the management. A stone and cement dam is being built at the 14th level, south, to prevent the rising water from flooding the workings tributary to No. 1.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

The new rockhouse at the St. Clair shaft is completed. The West vein shaft is down 850 ft. Some large masses have been taken out. Sinking in the St. Clair incline shaft is down 1,750 ft. This fissure vein is very narrow, but yields an excellent grade of stamp rock.

Mohawk.—The production in February was 332.4 tons of mineral. All three heads at the mill are working, and there should be a considerable gain this month.

Phoenix Consolidated.—The February production is estimated at 50 tons of refined copper.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure Consolidated.—The estimated production in February was 47.5 tons of refined copper.

Mass Consolidated.—This mine produced 105 tons of refined copper in February.

Michigan.—There are several thousand tons of good grade stamp rock on the stock piles which will be shipped to the mill when the weather permits. At present the stamp is operated day shift only, treating 225 tons of rock per day. The February output was 123.5 tons of mineral. The unidentified fissure vein opened a short time ago by a cross-cut from the 14th level of shaft A is 6 ft. wide, and rich in mass and barrel copper, besides carrying a fine stamp rock.

Victoria.—The new machine shop is completed and fully equipped.

MISSOURI.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Central.—The force at the Theodora shaft has been almost brought up to the normal. The complete defeat of the union in this strike has started its disintegration in this district.

National Lead Co.—The bottom again fell out of the mill reservoir for re-settling the mill water, on account of the sink-holes underlying this portion of the property. A bulkhead in the mine prevented serious damage.

St. Joe Lead Co.—At No. 7 shaft an accident to the air-compressor will stop mining for a month. The general output will be maintained by increasing the force in the Bonne Terre mine.

MONTANA.

BROADWATER COUNTY.

(From Our Special Correspondent.)

Black Friday.—Butte parties are negotiating for a bond and lease on this old Radersburg gold property. In the early days of stamp milling in the State, the oxidized ore was run through a 10-stamp mill, saving about 55% of the values.

East Pacific.—This Winston property, owned by R. A. Bell, of Helena, is to have a concentrator built for handling the second-class dumps, from which it is estimated $200,000 can be recovered.

FERGUS COUNTY.

Barnes-King.—A 210-ton tank, recently completed, will increase the daily capacity of the mill about 30 tons. A new hoist-house was also completed recently and the ore bin enlarged to 200 tons capacity. About 95 men are at work.

JEFFERSON COUNTY.

American Development & Mining Co.—The property has been sold to W. S. Goodyear at a receiver's sale. The Idaho property consisted of 52 lode claims, four mill sites and 10 placer claims, near Gibsonville, Ida., and other points in that state, and 200 in. of water in the north fork of Salmon river, and 500 in. of water in Dahlonego creek. The Montana property comprises 21 lode claims, two mill sites, and the Heady homestead. The Idaho claims were bid in for $1,000, including an agreement to pay delinquent taxes amounting to $2,400, which were compromised at $1,450. The Montana property was sold for $6,000, $600 being paid down.

(From Our Special Correspondent.)

Custer.—Patrick Dowling, of Basin, who is working this property through the Hiawatha tunnel, has paid to the eastern owners $1,500 in royalties to date from the ore shipments.

East Hiawatha.—Morgan & Murray, of Basin, are opening up a shoot of shipping ore in the tunnel on this property.

LEWIS AND CLARKE COUNTY.

Eclipse-Argo Mining Co.—This company has been incorporated with a capitalization of $300,000 to take over the property of the Eclipse Gold & Copper Mining Co. and the Argo Gold & Copper Mining Co. The directors are: A. W. Martin, Isabella Martin and H. N. Canoll, all of Helena.

MADISON COUNTY.

(From Our Special Correspondent.)

Alder Mining Co.—This company at Summit has purchased the Rough Rider, Cora Locke and Roosevelt claims at Summit. The company has also purchased the townsite of Summit for $5,000.

Granite Creek Mines.—Several new prospects are being developed and small shipments of gold ore are being made to the Butte smelters.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Butte Sampling Works.—About 2,000 tons monthly of silicious ore and concentrates are handled through the sampling mill for the East Helena smelter.

Geyman Mining Co.—The 300-ft shaft of the Yellow Boy mine of this company is to be sunk another lift. Most of the ore hoisted is run through a small concentrator near the shaft. Chas. Geyman is principal owner and manager.

Goodwin.—Cole & Pierson, of Feeley, are shipping some high grade silver ore to the Butte smelters. Car load shipments run 276 oz. silver and $4 gold. One 6-in. streak of ore, principally tetrahedrite, in which the copper is largely replaced by silver, is sacking 1,000 oz. silver to the ton. The property is about 22 miles from Butte.

Monitor.—Patrick Ferrell, operating this copper property at Butte, has opened up a new 4-ft. shoot of copper glance.

TETON COUNTY.

(From Our Special Correspondent.)

Swift Current Oil Co.—This company, operating near St. Mary's lake, reports it has struck a flowing well of oil. Preparations for other wells in the vicinity are under way. This district is some distance to the east of the Kintla Lake field and is supposed to extend north across the Canadian border.

NEVADA.

ESMERALDA COUNTY.

(From Our Special Correspondent.)

The Combination mine at Goldfield continues to ship high-grade ore. Numerous important discoveries in the district have caused great excitement locally and over 200 leases are now worked; the January has made a shipment, and at 35 ft. is extracting ore running from $140 to $250 per ton. The Goldfield Water & Milling Co. in a well 30 ft. deep has developed a flow of 4,000 gal. of water per day, and will erect a 5-stamp custom mill.

Goldfield.—At this camp on the Florence group free milling gold ore of shipping grade has been found on two leases; nearly 100 tons of ore have been shipped from the January lease. Cyanide tests on the combination ore made by Francis L. Bosqui at the mine show that high percentages of the values can be recovered.

Tonopah Gold Mountain Consolidated Co.—Lessees on this property are opening a 4-ft. vein, of which 8 in. are shipping ore, the remainder averaging $26 per ton.

Tonopah Gold Mountain Mining Co.—This company has shipped 2 car loads of ore which show values of 3.17 oz. gold and 31.6 oz. silver per ton; the third car load is being sacked.

NYE COUNTY.

(From Our Special Correspondent.)

A discovery of bismuth is reported 40 miles west of Tonopah on a claim which was being prospected for gold and silver. The vein is said to be well defined from 2 to 6 ft. wide and opened up for 900 ft. on the surface. The ore occurs as bismuthine and also as an oxychloride of bismuth, samples gave 4.48 to 4.83 bismuth, the ore also containing from 7 to 80 oz. silver, with traces of gold.

Silver Star Tonopah Mining Co.—This corporation has been formed at Washington, D. C., to purchase the Bounce and Silver Star groups of gold mines at Douglass, near Sodaville, which have been opened and worked by lessees, who crush the ore at a 5-stamp mill. The company, it is stated, will erect a 100-ton reduction plant.

Tonopah Belmont Development Co.—The vein recently cut on the 814-ft. level is 27 ft. wide, and assays from $50 to $70 per ton.

NORTH CAROLINA.

GUILFORD COUNTY.

(From Our Special Correspondent.)

Fentress.—The 10-stamp mill and concentrators are at work. The concentrates shipped run high in copper.

STANLY COUNTY.

(From Our Special Correspondent.)

Barringer.—A 20 lb. bar of gold, 950 fine, was produced last week by this mine, operated by the Whitney Co., and is the tenth bar shipped within a few months. Rich ore is opened on the 150 ft. level, a 10 lb. piece of which had 2 lb. of visible gold. E. B. C. Hambley, of Salisbury, is manager.

Parker.—Some rich gold quartz has been found in one of the veins. Several small nuggets have been picked up since the rains have set in.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Billings Group.—This property of 70 acres has been sold by George Billings, of Lead, S. D., to Douglas Lacey & Co., of New York. It consists of 70 acres, patented.

Deadwood-Standard Gold Mining Co.—No attempt has been made to run the mill during the winter, and it will not start until April. An aerial tramway is to be built from the mine to the mill.

Garden City Mining Co.—This company's territory with two adjacent claims, the Dauntless and Big Red, and the Oscar Waller mill site, have been sold to F. E. Little, of Minneapolis, for $40,000. There are 73 acres of mining ground turned in at $513 an acres and five acres of the mill site at $500 an acre. It is all patented, and situated adjoining the Penobscot Mining Co.'s territory at Garden City. Mr. Little, the purchaser, also holds an option on the Phillips group adjoining, belonging to Hattenbach Bros., W. L. McLaughlin and R. N. Ogden, of Deadwood.

Hidden Fortune Gold Mining Co.—At the annual meeting March 1 Henry J. Mayham, of Denver, was elected president, John P. Allison vice-president, George D. Begole, Denver, secretary, W. T. Perkins treasurer. It was voted to issue $250,000 in 6% five-year bonds for the payment of indebtedness. J. H. Schnitzel, of Lead, has been appointed general manager, succeeding A. H. Danforth. The cyanide mill has suspended while Mr. Schnitzel is organizing matters.

Homestake Mining Co.—Both cyanide plants are being enlarged. No. 1 is to receive six new vats and No. 2 is having its five vats increased in size. Work is conducted so as not to interfere with operations, one vat being enlarged at a time.

Horseshoe Mining Co.—The cleanup at the cyanide plant this week resulted in $18,000, which was deposited in the United States assay office at Deadwood.

Penobscot Mining Co.—A new air compressor has been ordered, capable of running 18 drills. The compressor now in use is a Rand, made for 6 drills. Prospecting has been resumed and is carried on night and day. Mining is performed only with day shift.

Spearfish Gold Mining & Reduction Co.—The last cleanup at the cyanide plant resulted in a bar of bullion worth $11,000. Cleanups are made twice a month.

UTAH.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Ore Shipments.—For the week ending March 11 aggregated 120 car loads, as follows: Ajax, 2; Bullion-Beck, 8; Centennial-Eureka, 29; Eagle and Blue Bell, 2; Grand Central, 14; Gemini, 26; Lower Mammoth, 10; Mammoth, 13; Tintic, iron, 9; Tetro, 3; Uncle Sam Con., crude, 2; concentrates, 2.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated.—The shipments of copper bullion for the week ending March 11 aggregated about 182,000 lb.

United States Smelting Co.—The reduction plant at Bingham Junction has five furnaces in operation, handling from 800 to 900 tons of ore daily. The sixth furnace is about completed. These furnaces are all 42 by 180 in. The matte from the furnaces is handled by two stands of converters. In the power house are four cross-compound Allis-Chalmers blowing engines for the furnaces and another for converter blast; a lighter engine, which operates two generators—one direct current and one alternating—furnishes electricity for lighting the premises and for hauling ore from the bins to the charge floor. Steam is produced by four Sterling boilers, aggregating 1,000 h. p. The power plant is being enlarged, and several Connorsville blowers will be installed to supply the blast to three lead stacks, which will be installed later. The lead furnaces will have an approximate capacity of 200 tons each per day.

United States Smelter.—Shipments of copper bullion for the week ending March 11 aggregated 242,596 lb.

Utah Consolidated.—Shipments of copper bullion for the week ending March 11 amounted to 302,715 lb.

Winnemuck.—This old mill, under lease to the Ohio Copper Co., is in charge of John Brooks. Over 100 tons per day of ore are concentrated. The mill has been provided with new equipment throughout, consisting of crusher, two sets rolls, six jigs, a Chilean grinder, several Wilfley tables and a Wilfley slimer. Following each set of rolls are rotary screens, the oversize from these passing to jigs and the undersize to hydraulic classifiers. The jigs make 4, 6 and 8-mesh products, the jig tailings passing to the Chilean mill, which grinds to 16-mesh, the latter product being distributed to Wilfley tables through the hydraulic sizers. Each sizer has two or more compartments, and the final overflow is pumped to settling tanks, the settled material from the tanks passing to the Wilfley slimer. The mill product amounts to about 20 tons of concentrate from 100 tons of ore, the concentrate running from 27% to 38% copper.

SUMMIT COUNTY.

California.—Manager W. I. Snyder has arranged to purchase this property again for the stockholders and has made a payment of $12,500. The balance, about $15,000, is to be paid six months hence, when the property will be deeded back to the company. A small force has been put to work in the mine.

Keith-Kearns.—This mill has been turning out 65 to 70 tons per day with one shift of seven men. Another shift of five men has been added. The ore to be treated is run over a trestle to the top of the mill, dumped into a 150-ton bin, then fed into a Gates breaker. The crushed product enters a roughing trommel next, after which it passesc into the four 16 by 36 in. Davis rolls and thence into the regular trommels, where it is reduced from coarse to fine, the oversize being taken back by means of an elevator to be crushed. In the jig room, 45 by 24 ft., there are eight two-compartment jigs of the Hartz pattern. After leaving the jigs the product is treated by a paddle wheel, which separates the tailings from the water, allowing the former to go into the tailings bin and directing the water back to the sizer. From the two 5-ft. Huntingtons with 20 mesh screens the material is carried to a classifier, after which it is ready for the tables. The table room, 48 by 50 ft. is on the ground floor and contains six Wilfleys and one Wilfley slimer. The engine and boiler room is 40 by 50 ft., the power for the entire mill being furnished by a Hamilton-Corliss 16 by 36 in. engine, and two 80 h. p. boilers.

Majestic.—Four feet of ore has been struck in the shaft at this property. Assays show 54% lead, 34 oz. silver and $4.13 gold.

WASHINGTON.

FERRY COUNTY.

(From Our Special Correspondent.)

Republic Ore Shipments.—During the week the following shipments were made: Mountain Lion 560 tons to the Trail smelter, the Knob Hill 120 tons to the Granby, Quilp 300 tons to the Everett smelter, Zala M. 30 tons to the Granby smelter.

Pearl Consolidated Gold Mining Co.—The connection has been made between the shaft and crosscut from the No. 2 Lone Pine vein. A

small hoist, boiler and pump have been installed at the shaft to sink to 350 ft.

WISCONSIN.

IOWA COUNTY.

Dodgeville Smelting & Milling Co.—This company, recently incorporated with a capitalization of $100,000 has purchased the Bennett & Hoskins lead smelter at Dodgeville, and will begin operations at once. A mill for the concentration of zinc will be built for the company this summer, and will cost about $50,000. The officers of the company will be J. A. Spence, president; Joseph Bennett, vice-president; H. B. Fargo, secretary-treasurer; H. B. Whitman, manager.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending March 5 shipments amounted to 16,131 tons as follows: Granby, 10,880; Mother Lode, 4,096; Senator, 264; Oro Denoro, 825; Athelstan, 66; total for year to date, 150,950 tons.

Granby Consolidated.—An eight-furnace addition is planned for this smelter at Grand Forks to increase the capacity to 4,800 tons per day.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending March 5 shipments aggregated 8,498 tons as follows: Le Roi, 5,248; Centre Star, 1,080; War Eagle, 780; Kootenay, 180; Jumbo, 280; Le Roi No. 2, 590; Le Roi No. 2 (milled), 340; total for the year to date, 82,965 tons.

CENTRAL AMERICA.

HONDURAS.

New York & Honduras Rosario Mining Co.—A circular issued by W. S. Valentine, of New York, president of this company, states that the company now has 100,000 tons of high grade ore in reserve; that the main ore chutes have been completed, that cleaner and better ore is mined, and that most of the main tunnels have tracks of steel rails. The new sorting plant is satisfactory, and is to be enlarged. The mill will soon have nine double discharge batteries, with new stamp heads. Plans are underway for discarding the present long flumes and water wheels, erecting a large plant and transmitting electric power to the mill. E. A. Hardy is to act as assistant manager at San Juancito, Honduras.

SOUTH AMERICA.

FRENCH GUIANA.

(*From An Occasional Correspondent.*)

A company has been formed in France, with a capital of 7,500,000 fr., to exploit the gold placers known as Adieu-Vat and Bonne Aventure, both situated on the Sinnamary river. M. Reitlinger is at the head of the company.

A company has been formed in France for the purpose of buying two large placer concessions belonging to M. Melkior and M. Weishaupt, in this colony. The prices to be paid are 3,000,000 fr. and 1,500,000 fr., respectively. The Melkior concession is now being worked with a force of about 150 men and an average return of about 1,000 oz. gold per month. Only a small part of the concession is now worked.

Mr. D. E. Headley has recently discovered a quartz vein on the property of M. Sonemongon, a large mining operator in this colony. The outcrop of the vein is 15 ft. wide and shows good assays in gold. M. Sonemongon was one of the pioneers in the discovery of the Carsevenne district.

The exploration for diamonds, which was started in December, 1902, has so far met with no tangible result, although a few stones of small commercial value have been discovered.

It is reported that platinum has been discovered in one of the placers on the river Approuague. Specimens have been shown, but the discoverer declines to give the exact locality.

MINING STOCKS.

(Full quotations given on pages 464 and 465.)

New York, Mar. 16.

The final decision, adverse to the Northern Securities Co. has not been a surprise, as it had been long ago discounted. Therefore the stock market is not affected, and instead of weakness prices appear to have hardened.

Amalgamated Copper was uneasy, selling down to $44 and then rising to $47.25. Anaconda changed hands at $16@$16.25. Curb coppers were quiet. Greene Consolidated, of Mexico, settled to $10.125. Recently Tennessee sold up to $32, in acknowledgment of the improvement in property and earnings.

Gold and silver shares are uninteresting, excepting that the "faithful" in the Comstock section are handing out another line of assessments.

Boston. Mar. 15.

(*From Our Special Correspondent.*)

This market continued narrow, with a general downward tendency until Monday, when, under the stimulus of the Northern Securities decision, the atmosphere became considerably clarified. The exception is Daly West, and under forced selling the price dropped from $34.25 to $28.50, with subsequent recovery to $30.75. The selling apparently emanated from the West, and the selling of some 2,600 shares was thought to be from inside sources. Up to the time of writing, nothing has been learned derogatory to the property. The market for Daly West stock is necessarily a limited one here, especially at this time, and the offering of any large amount of stock injures the price. Utah Consolidated eased off fractionally, but closed better than a week ago, at $34.25. United States Mining has again become active, selling up to $21.50 to-day. The company has reduced the stock in the public's hands to about 405,000 shares, by the purchase in the market of some 14,000 shares, which have been placed in the treasury.

Copper Range showed activity to-day and advanced to $41.25, although it sold $2 below this price a few days ago. Osceola has been quiet at $56@$57. The annual meeting last week resulted in the displacement of one of the Lake directors by a Mr. Chrimes. The remark was brought forth at the meeting that the company disposes of its product as it sees fit.

Guanajuato, which has been dead for some time, spurted to 99c. last week, but has relapsed into dullness again. Mass Mining is steady around $3.50. No change was made in the board at the annual meeting. Expenditures last year exceeded receipts, including assessments, by $88,412, yet there was a balance December 31, 1903, of $110,696. Phoenix touched $1.50. The annual report shows an excess of expense last year of $88,034, with a total deficit of $75,039 December 31, 1903. Last year $100,000 assessment money was taken in.

Tamarack is firmer at $94@$95. There has been some trading in Parrot at $22.50@$21.50. Quincy is firmer at $84@$85. Wolverine is quiet at $74@$74.50. The annual meeting of the Centennial Copper Mining Co. is called for April 5. The stock is heavy around $17.

The Boston Consolidated Mining Co. announces that it has paid off $20,000 of its floating debt and will liquidate the balance of $30,000 within a month.

Colorado Springs. Mar. 11.

(*From Our Special Correspondent.*)

The market for mining shares on the local exchange is not as good at the close of the week as it was at the beginning. Investors seem to be inclined to take fair profits, and selling orders have been the result. However, all stocks, in which trading was heavy, have held up well, and although somewhat lower in price than a week ago, sustained the advance of the past few weeks unusually well. The offerings on the exchange were heavy, but the market seemed ready to absorb them and lost but little of its strength. The stock of the new Isabella Co., formed by a consolidation of the Isabella and Empire State properties, was called for the first time, and was fairly active at prices ranging from 37 to 34c. per share.

Salt Lake City. Mar. 12.

(*From Our Special Correspondent.*)

Two Utah mines paid dividends during the past week, and two more posted them. The distributions were made by the Daly West and the Silver King, the former $117,000 and the latter $100,000. The Grand Central directors decided to appear again with $25,000, and the Utah mine of the Fish Springs district, after a vacation of several months, will pay out $1,000. The stock market has been dull, with little inclination to pick up. Yankee Consolidated and Grand Central advanced a little, while Daly West, New York Bonanza, Star Consolidated and Tetro show shrinkages. Consolidated Mercur fluctuated to some extent, but at the close held its own. While the stock market has been in bad order, development of the mines is progressing steadily and with more vigor than ever before. The large producers continue with their usual output. This is particularly true of Bingham. Some delay has been caused in getting the Utah Copper plant started, but it will be in full commission next week.

San Francisco. Mar. 10.

(*From Our Special Correspondent.*)

The market for the Comstock shares was rather dull and heavy during the first part of the week, but later it improved somewhat, especially for the north end stocks. The middle stocks were also fairly well sustained, but the Gold Hill shares were rather heavy, on account of the numerous assessments.

Some prices noted were: Ophir, $4.55; Best & Belcher, $2.05; Consolidated California & Virginia, $1.80; Mexican, $1.75; Caledonia, $1.05@$1.15; Savage, 70@75c.; Yellow Jacket, 35c.; Chollar, 19c.; Potosi, 15c. per share.

On the San Francisco & Tonopah exchange business was moderate, but prices remained generally pretty steady. Montana Tonopah sold at $1.20@$1.25; Tonopah Extension, 70@75c.; Tonopah Belmont, 55@60c.; Tonopah Midway, 40c. per share.

On the California exchange trading in oil shares was rather slow and the market was easy. Sovereign sold for 46c.; Apollo, 45c.; Wolverine, 40c.; Superior, 5c. The higher priced stocks were hardly mentioned.

The monthly record of sales on the California exchange for this year has been as follows:

	Shares.	Value.
January	84,507	$31,389
February	96,677	45,556
Totals	181,184	$76,945

It will be seen that February showed an improvement over January, both in number of shares and in value.

San Luis Potosi. Mar. 9.

(*From Our Special Correspondent.*)

Exchange on New York went up during the week from 216½ to 220, closing at 218.

Mining stocks continued in their downward course. Victoria, of El Oro dropped from $156 to $135; Dos Estrellas from $1625 to 1590, and La Paz, Matehuala, from $153 to $148. Aldebaran went from $40 to $55; Maria del Oro, $30 to $35, and Union, of Oaxaco, $50 to $52.50. The Noche Buena brought $9, Old Abe, $8, Luz de Borda, $65, Reina del Real del Monte, $10, La Union, $50, San Ignacio, $10.50, Ocotes, $10, and San Felipe de Jesus, $18.50.

COAL TRADE REVIEW.

New York, Mar. 16.

ANTHRACITE.

Though the weather during the week has been far from springlike, and though the demand for anthracite is better than is usual at this season, yet with April 1 near buying is necessarily for immediate needs; in fact, the market may now be called quiet. There has been considerable discussion as to what will happen April 1. While nothing definite can be said yet, it is altogether likely that a reduction of 50c. a ton will be made. A reduction of 25c, per ton, as suggested in some quarters, would hardly be worth while. To put off a reduction until May 1, also suggested, would,

it is true, shorten the time of slack markets in the fall, but would cut just as much out of the spring buying, since there is no reason to suppose that with winter over much coal could be sold in April at winter prices.

Production during February was liberal, considering the interruptions to traffic on the railroads, and the cold weather, which interfered with operations at the mines and washeries. The total shipments for the month were 4,326,269 tons, as compared with 5,070,608 tons for February, 1902. The total shipments to March 1 this year were 8,460,514 tons, as compared with 11,035,558 tons for the same period last year.

In the Northwest storms have interfered greatly with traffic, but stimulated buying, supon docks are diminishing, and will be small at the opening of navigation. In Chicago territory business is rather quiet, a snowstorm has caused delay in shipments to out-of-town points, and tied up the movement of coal west of Buffalo. Supplies on docks are running low, and will be probablw cleaned up by the opening of navigation. In the all-rail trade farther east and in Canadian territory the roads which had considerable trouble from freshets are now in better shape. Demand from Canadian quarters is still quite strong. Along the Atlantic seaboard, while there is some buying for immediate wants, the market is inactive, except at points beyond Cape Cod, where retail demand is good. Those roads that had their lines in the mining region temporarily obstructed by ice, due to freshets, are now running trains as usual.

BITUMINOUS.

Demand in the seaboard bituminous trade remains strong, being continued, and even increased, by the very poor transporattion given by the railroads last week. The Pennsylvania Railroad was practically cut in half at Harrisburg for several days, and at the same time transportation on either side of the break was very poor, as a result shipments over the Peensylvania amounted to nothing for nearly a week. They were greatly restricted over the Baltimore & Ohio. Naturally the shortage at tidewater increased and all shippers now have on hand an accumulation of orders that they will hardly be able to clean up in several weeks. As a result prices have stiffened, ordinary grades of Clearfield selling at $3@$3.15, f. o. b. New York harbor shipping port. Producers are much firmer on contract prices, while consumers have become anxious to close contracts. A considerable number of contracts have been closed during the week at the top prices considered by producers. It is as yet impossible to state just what these prices have been on the average. Producers are now receiving coal at tidewater in better quantity than since the beginning of the week, but are merely endeavoring as yet to take care of these consumers who are out or nearly out of supplies.

As regards the labor situation reports from the Central West indicate that the miners will accept the reduction offered by the operators. It is likely, therefore, that a corresponding small reduction will be accepted by miners working under the Altoona wage scale.

In the far East demand has increased, and all consumers are trying to fill in stocks that are more than usually depleted. Shippers have a considerable number of orders from this territory to be filled as arrivals at tidewater permit. All along Long Island sound demand is heavy, and the general condition of the trade very different from what it was a few weeks ago, producers being unable to take care of all the orders they now have from that territory. At New York harbor points trade is active, and as consumers here have smaller storage room, their immediate necessities seem greater, and have to be cared for more promptly.

In all-rail territory demand is strong, but producers are not allowing consumers to increase their orders much, merely allowing them enough to keep going, sending the balance or what car supply permits to tidewater.

Transportation from mines to tidewater is still irregular, though coal is now coming through more freely. On account of blockades caused by the freshets cars are badly mixed, and in some cases cars that left the mines two weeks apart arrive at tidewater on the same day. Car supply at the mines is 35 per cent. of the demand, with chances of it increasing. In the coastwise vessel market vessels are in fair supply, but on account of the small amount of coal offering freights have weakened slightly. We quote rates from Philadelphia as follows: Boston, Salem and Portland, $1.15@$1.25; Providence, New Bedford and Long Island sound, $1.10. From New York harbor rates are $1@$1.10 to around Cape Cod.

Birmingham. Mar. 14.

(*From Our Special Correspondent.*)

The Alabama coal market is still active with no prospects of abatement. The production is heavy, and the railroads are being called on to move the products promptly, which is proving quite a task, there being a shortage of coal cars.

The local demand is heavy. There is much coal moving outside of the State, especially to Florida points. Railroads in adjoining States are securing much fuel nowadays from this section, and fuel agents have been coming to the Birmingham district looking after their supplies.

There are labor troubles at the mines in the State, except the two or three places which have been unsteady for some months. The miners have again settled down to work for the month at the minimum mining wage, the pig iron average price not warranting any increase in their wages.

The letter of caution sent by the Chief Mine Inspector of Alabama, J. M. Gray, to all superintendents and foremen at the mines, it is believed will have some effect in reducing the number of fatal accidents, which have been happening at an alarming rate, 23 men having been killed already this year in the mines. Chief Inspector Gray says that there will always be accidents in the mines, but many of these are due to carelessness or over-confidence.

Chicago. Mar. 14.

(*From Our Special Correspondent.*)

For both anthracite and bituminous the market is becoming dull. This fact is attributed by dealers to the mild weather of the last two or three weeks, the effect being now apparent in lessened or countermanded orders. The business of the winter has been a heavy one, and there has been need of the abundant supplies laid in, both by rail and water, throughout Chicago territory early in the season. With the opening of navigation we shall doubtless see dock supplies well exhausted, despite the fect that they are estimated to have been 20 to 40% greater at the end of navigation last autumn than ever before.

The trade in anthracite naturally will be slack from now on to the establishment of spring prices, April 1. In the bituminous market there is much anxiety about the result of submission to the local unions of the question of a strike April 1, over the proposed reduction of wages. No important shipments have been made as yet, because of the fear of a strike, but everybody is on the anxious seat and closely watching the reports of how the miners feel. Should a strike be decided upon, bituminous will be poured into Chicago; should the unions accept the new scale, the present dullness will doubtless continue indefinitely. The bituminous trade has no more prospect of continuing strong than the anthracite, with the coming of spring.

There has been a general falling off in prices in a week. Indiana and Illinois are down 10 to 20c. on most grades; smokeless prices are less by the same figures, if not more; and Hocking by about 10c. Quotations now are: Smokeless, $3@$3.50; Hocking, $3.40@$3.65; Indiana and Illinois, $1.75@$2.60 for run-of-mine, and $1.60 @$1.75 for screenings. The demand for smokeless continues light, and even Hocking, generally strong, is somewhat weak.

Cleveland. Mar. 15.

(*From Our Special Correspondent.*)

The coal situation is much stronger than it has been. The demand for domestic material has not been quite so good, but this has been offset by an increase in demand for steam coal, the opening of factories and mills being responsible for that. The market for steam coal is strong, with no very great supply of the material on hand, the car shortage being annoying. Pittsburg steam coal is bringing about $1.25@$1.35 at the mines, and Ohio coals are running a little below that figure. The demand for domestic coal, while not so heavy, has been brisk.

The real interest in the situation is in the coke trade. The car shortage and the improved demand for the material have put the prices up. Prices hold steady at $2.25@$2.50 for 72-hour foundry coke, with high sulphur cokes running about $2.15. Furnace cokes are ranging about $1.75 at the oven.

Pittsburg. Mar. 15.

(*From Our Special Correspondent.*)

Coal.—All the mines in the Pittsburg district are closed this afternoon and the miners are voting on the proposition to accept or reject the ultimatum of the operators for a two-years' scale, based on pick mining at 85c. a ton for screened coal. The leaders are urging the men to accept and are predicting to-day that the proposition will carry by an overwhelming vote. The votes will be counted at the headquarters of the United Mine Workers at Indianapolis on Thursday. It is believed the Illinois miners will vote strongly for a strike. There has been but little new business taken, owing to the uncertainty of the situation, and it is impossible to give any definite quotations on prices. Run-of-mine coal has sold lately at from $1.20 to $1.40 a ton at the mine. Fully 2,500,000 bush. of coal were sent down the river during the past few days and more will go out as soon as the tow boats return. A heavy demand for coal is reported from down river markets.

Connellsville Coke.—There is a marked improvement in the demand for coke, and prices are advancing. Over 500 ovens have been added to the active list, and both production and shipments last week showed large gains. Furnace coke is still quoted at $1.65@$1.75, but indications point to an advance to $2 before very long. Foundry coke remains at $2.25@$2.50. The production for the week was 203,103 tons. Shipments aggregated 8,620 cars, a gain of 603 cars. They were distributed as follows: To Pittsburg and river points, 3,403 cars; to points west of Pittsburg, 3,887 cars; to points east of Everson, 1,330 cars.

San Francisco. Mar. 10.

(*From Our Special Correspondent.*)

Business continues quiet, with receipts about as usual, and no change in prices.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coss Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Mar. 16.

Export trade continues quiet here. Some inquiry is reported from South American ports, but no business has resulted so far.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of March 5 that, owing to the continued demand for coals in the Far East, prices for bests remain steady, and all other grades of coal are firm. Some prices noted are: Best Welsh steam coal, $3.84; seconds, $3.72; thirds, $3.60; dry coals, $3.54; best Monmouthshire, $3.30; seconds, $3; best small steam coal, $1.98; seconds, $1.74; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days less 2½% discount.

The freight market is unchanged, except South American ports, which are rather steadier. Some rates from Cardiff are: Marseilles, $1.35; Genoa, $1.50; Naples, $1.44; Las Palmas, $1.44; St. Vincent, $1.56; Rio, $2.28; Santos, $2.40; Buenos Aires, $1.92.

IRON TRADE REVIEW.

New York, Mar. 16.

Reports this week from the iron and steel market are of a more encouraging nature. Buyers seem to be taking hold in a better way, and inquiries are now rather for contracts running up to the end of June than for the immediate deliveries which have been the rule for some time. The United States Steel Corporation, it is stated, has exercised its option for an additional 65,000 tons of pig iron from outside furnaces, making 130,000 tons actually purchased in all; and it has taken further options for 45,000 tons more of bessemer pig. The price in those transactions is $13 at furnace. In the local markets more buying of foundry iron is reported, and generally at advances of 25c. to 50c. per ton. Southern furnaces are taking some heavy orders, and a reaction from the low price of $9 for No. 2 foundry has set in.

In steel billets also there have been considerable transactions, and prices are reported firm at the level fixed by the pool. There is no present intimation of cutting.

In finished material advances are reported of $2 per ton for bar iron, and $1 for steel bars. In Philadelphia and in the West the demand for structural steel is improving, although no large orders have been placed so far. In New York it looks very much as if the structural business was going to be killed for the season by the continued fight in the building trades. Prospects for bridge work for the summer are better, however.

Little or nothing is heard just now about export trade. It is intimated that plans for such trade are being worked out, but in a very quiet way.

Birmingham. March 14.

(*From Our Special Correspondent.*)

As was anticipated, there has been a steady demand for pig iron in the Southern territory; during the past week prices have gone up a little and still have an upward tendency. No. 2 foundry iron is selling at $9.50 per ton, while a better price is reported to have been asked and secured a few days since. From $9 to $9.25 has been the price for No. 2. The Sloss-Sheffield Steel & Iron Co. report sales since March 1 of over 50,000 tons, while other companies have been doing nicely. The Alabama Consolidated Co. in one day last week booked orders for more than 1,500 tons of iron at the $9.50 for No. 2 foundry.

Production in this State is holding up. The next furnace to go into operation will be No. 2 furnace of the Republic Co. at Thomas. The Tennessee Co. is pushing the work of the construction of the new furnace at Ensley.

The following quotations are given: No. 1 foundry, $9.50@$10; No. 2 foundry, $9.50@$9.75; No. 3 foundry, $9@$9.25; No. 4 foundry, $8.50@$9; gray forge, $8.50; No. 1, soft, $9.50@$9.75; No. 2 soft, $9.50@$9.75 per ton.

Chicago. March 14.

(*From Our Special Correspondent.*)

An advance of 25 to 50c. a ton on both southern and northern pig iron has occurred in the last week. For the most of the sales, the higher advance prevails firmly, and the whole tone of the market is much better. This fortunate situation—for sellers at least—is ascribed by local agents to two causes: continued effect of the recent large sale to the United States Corporation, and the reduction of stocks generally through good buying and lessened production. That the market is on the upward path seems highly probable, though it would be rash to make unqualified predictions, in view of the fluctuations that have occurred in the local market during the last six months.

Northern is now selling at $13.75 f. o. b. Chicago for No. 2, against $13.50 last week. Southern brings $9.50, Birmingham, or $13.35 Chicago, against $9, Birmingham, last week. Sales are good, better than they have been for a long time, in fact. The total is above the average of recent weeks, and lots of 1,000 to 5,000 tons have been placed. It is significant of growing confidence on the part of buyers, that the time between purchases and deliveries is increasing. One large firm reports that it could dispose of its entire product for the rest of the year. There is much less demand for small, quickly-delivered lots than there has been. Lake Superior charcoal is sharing in the increased demand and has advanced to $15, Chicago, being in brisk demand.

Coke has recovered from the depression that has characterized the market for the last month, and is firm at $4.90, for 72-hour Connellsville. It is growing scarce, the surplus on tracks being well cleaned up, and the heavy storm of to-day, by delaying transportation, doubtless will send the price higher in the week just opening.

Cleveland. Mar. 15.

(*From Our Special Correspondent.*)

Iron Ore.—The ore situation is not changed materially, but there is a better feeling in the trade as a result of the recent buying of pig iron, which argues a better consumption of ore. Vessel owners are inclined to hold for better prices. It is hardly possible there will be any movement toward the establishment of a general basis of prices this year, the Ore Association seemingly being clear out of line on that question.

New York. Mar. 16.

Pig Iron.—Locally the market is more active than in weeks. Prices are higher. We quote at tidewater as follows: No. 1 X foundry, $15.75; No. 2 X foundry, $15; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.50. For Southern irons on dock quotations are: No. 1 foundry, $14.25; No. 2 foundry, $13.75; with lower grades in proportion. No. 1 soft can be had at about $14.25, and No. 2 soft at $13.50.

Bar Iron and Steel.—The market is firmer. Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.35c.

Plates.—Sheared plates are quoted as follows: Tanks, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33 @$36, according to weight.

Structural Material.—The local demand is likely to be seriously affected by the threatened labor troubles in the building trades. Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. Mar. 15.

(*From Our Special Correspondent.*)

Pig Iron.—The presence of quite a number of buyers in the market this week furnished encouragement to agents and representatives of furnaces. The cause for this increased interest is the evidence of hardening values. Up to this hour only small sales have been closed, although the aggregate of business is large. Some furnaces are quoting 25 to 50c. per ton higher, but it is noticed that in these cases quickest delivery possible is conditioned. There is more inquiry for forge iron than we have had for some time. The quick dispatch of business is interfered with by rumors and reports from handlers of Southern iron. Basic iron has made a decided move upwards, and two or three good lots have been sold. Offerings are made of Virginia basic, with a probability of large sales. While there has been no decided change in quotations, a fair range of prices may be given as follows: No. 1 X foundry, $15.50; No. 2 X, $15@$15.25; No. 2 plain, $14.50; Southern No. 2, rail, $14; standard forge, $14; basic, $14.

Plates.—Some heavy orders for plate are due this week; the mill men are in close touch with an unusual amount of business, part of which is for the shipyards. Tank steel is quoted at 1.78¼ for the smaller lots that are selling. Nos. 9 and 10 are selling at 2.03½c.; locomotive firebox, 2.28½c.

Old Rails.—Old rails are selling with more freedom, iron being taken at $15.25@$15.50.

Scrap.—A good deal of scrap has been purchased during the past few days, and everything in sight is now either bought or contracted for. Quotations for heavy steel scrap are $14; No. 1 wrought railroad, $17.50; machinery, $13.50.

Pittsburg. Mar. 15.

(*From Our Special Correspondent.*)

The total tonnage of pig iron purchased by the United States Steel Corporation, it is now estimated, will exceed the original figures given out regarding the transaction. On Thursday it exercised its first option, closing with the Bessemer Pig Iron Association for 50,000 tons and with W. P. Snyder & Co. for 15,000 tons for April delivery. This, it is now positively stated, is a duplication of the tonnage bought for March shipment, or a total of 130,000 tons. The Corporation took further options good until April 10 on 30,000 tons from the Pig Iron Association and 15,000 from the Snyder interest for May delivery, provided the March 10 options were exercised. The price was straight $13 a ton at the furnace for the total amount of 175,000 tons under negotiation, and no side issue of any kind. Reports of conversion deals and exchanges of coke are denied. The Corporation reserves the right to cancel on the 10th of any month iron that is due on the contract and remains unshipped. It is now impossible to buy bessemer pig iron at $13, Valley, the effect of this purchase having been to put up the price. Some heavy sales of all grades of pig iron have been reported within the past 10 days, but upon investigation it was learned that some of the reported sales are merely inquiries, but there is no doubt but that several large contracts will be closed this week. Many consumers who have been waiting are now coming into the market, indicating that lower prices are not at all probable. Most of the Pittsburg district and Valley furnaces are now in operation. Some are said to have withdrawn from the market, being sold up for from six weeks to two months ahead. There has been a general advance in both northern and southern foundry and forge iron of from 50 to 75c. Several important sales of northern No. 2 foundry have been made during the week at $13.75@$14, Pittsburg, and gray forge has sold at from $13 to $13.25. Southern foundry is quoted this week at $9.75, Birmingham, and gray forge at $8.50.

The steel market shows as great an improvement as the pig iron market, prices being firm in bessemer and open-hearth billets and sheet bars and stronger in all finished lines except tin plates and sheets. A consumer in the Pittsburg district has bought 4,500 tons of bessemer steel billets at the pool price of $23, and a number of smaller purchases have also been made. Both iron and steel bars have been advanced this week. Iron bars were advanced $2 and steel bars $1 a ton at meetings held here yesterday afternoon. The basing point of bar iron has been removed from Youngstown to Pittsburg, and the minimum price fixed at 1.35c., but for all iron delivered in the Pittsburg region the rate is 1.45c. Heretofore the price was 1.30c., Youngstown, with freight of 4.75c. per 100 lb. added for Pittsburg delivery. Prices for western shipment will be 1.35c., Pittsburg, plus freight to destination. Bar iron prices started to decline shortly after the opening of the year, and sales were reported to have been made at 1.25c and as low as 1.20c, Youngstown. It was believed that a sufficient number of low-priced orders had been booked to have an effect on the wages of the puddlers and finishers in the union mills of the country. This was found to be incorrect when the bi-monthly examination of the sales sheets of the Republic Iron & Steel Co. and the steel hoop department of the Carnegie Steel Co. was made at Youngstown during the week under the sliding scale of the Amalgamated Association of Iron, Steel & Tin Workers. The average, for the months of January and February was found to be about 1.30c., and wages for March and April will remain unchanged. The steel bar makers advanced the price $1 a ton from 1.30 to 1.35c. Another increase likely will be made at the next meeting. It is estimated that fully 150,000 tons of steel bars have been sold since January 1 at the old price, for delivery during the year.

The result of the conferences between officers of the American Sheet & Tin Plate Co. and the Amalgamated Association was made public to-day. The company has made a proposition to start all of its idle sheet and tin plate plants if the workers will accept a reduction of 20 per cent from the Amalgamated scale. It is charged that the independent union manufacturers are resorting to various schemes to evade the scale. If the proposition is accepted, employment will be given to thousands of idle sheet and tin-plate workers. The officers of the Amalgamated Association to-day called a meeting by telegraph of the general executive board of the organization for Thursday to consider the proposition. The board is composed of the national officers, the advisory board and the vice presidents of the ten districts in the association, and is the highest body outside of the general convention.

Pig Iron.—Thousands of tons of all grades of pig iron were sold during the week, in addition to the 65,000-ton contract for bessemer iron made by the United States Steel Corporation. The exact tonnage can not be accurately given, as reports vary, some including inquiries with actual sales. Bessemer is quoted at $13.10 @$13.25, Valley; foundry No. 2, at $13.75@ $14, Pittsburg, and gray forge at $13@$13.25, Pittsburg.

Steel.—A number of sales of billets and sheet-bars were made during the week, the largest being the purchase by a Pittsburg district interest of 4,500 tons of bessemer billets at the pool price of $23. The market is firm and there is no shading. Steel bars are likely to advance $1, or possibly $2, per ton at the meeting scheduled for this afternoon, the price prevailing since last November being 1.30c. Plates are firm at 1.60c.

Sheets.—The sheet market is quiet, but the leading producer has booked some new business, and a probable advance in prices is rumored. The independents are reported to be shading the price quoted by the large interest of 2.30c. for black and 3.30c. for galvanized No. 28 guage.

Ferro-manganese.—There is a fair demand for both foreign and domestic 80%, and prices range from $41.50 to $42.50.

CHEMICALS AND MINERALS.

(See also Prices-Current, Page 466.)

New York, Mar. 16.

Aside from regular contract deliveries, business has been uninteresting. Prices generally are firm, and foreign trade begins to feel the advancing ocean freights as a result of the war in the Orient.

The affairs of the Eastern salt combinations are still unsettled, and the recent intervention of the judiciary has necessitated a re-sale at auction of the properties of the National Salt Co., whose shares are principally owned by the International Salt Co., of New York. The International Co. also controls the stock of the Retsof Mining Co., and the International Salt Co., of Illinois. At the recent annual meeting of the parent company it was learned that the ruinous contracts which have been entered into by the National Co. have in large part been annulled by the courts, though the final disposition of them is not yet complete. The litigation over the contract with the United Salt Co., of Ohio, has been favorably decided by the courts, and will soon be brought to a final and satisfactory conclusion. With the exception of a dividend from the International Salt Co., of Illinois, nothing has been received during the year upon the stocks held by the International Co., of New York. In fact, it has been necessary to borrow money to meet the interest of the bonds of the parent company. It is also intimated that there was a falling off in the salt business in 1903.

The fertilizer combinations have declared their regular preferred dividends. Again the Virginia-Carolina Chemical Co. has passed its quarterly common dividend, making three-quarters since the last payment, which is equivalent to a saving of $1,149,415.

In the recent opening of bids by the Navy Department rather low prices have been named on standard products.

The lowest bidders for furnishing supplies for the New York Navy Yard were: Red lead, dry, 100,000 lb. at $5,939.80, by James Langmuir; white lead in oil, 225,000 lb., $12,343, by Fiske Bros. Refining Co.; zinc white in oil, 230,000 lb., $14,037.50, by Abraham L. Hirsh; Venetian red, dry, 20,000 lb., $475, by Charles M. Childs & Co.; aluminum paint, 300 gal., by Oscar Schlegel; yellow ocher, dry, 2,000 lb., and 10,000 lb. in oil, metallic brown, 4,000 lb., lamp black, 3,000 lb., drop black, 1,000 lb., and brown zinc, 2,000 lb., all at $962.60, by James Langmuir; calcium phosphite, 200 lb., $354, by Abraham L. Hirsh; graphite for lubricating, 2,000 lb., $235, by Joseph Dixon Crucible Company.

Advices from abroad state that Brunner, Mond & Co., doing a large export business with America, are completing arrangements to erect a new ammonia-soda plant at Lostock Gralam, Northwich, England. An estimate of the cost of the works puts the figure at nearly $1,000,000.

According to report the Government of Peru will hereafter not open to private denouncement the saltpeter and borax deposits.

Cyanide.—British makers are exporting substantial quantities of potassium cyanide on the basis of 16c. per lb., f. o. b. Momentarily trade with the United States is quiet. Importers of German and British cyanide at New York, quote 19@20c. per lb.

Bleaching Powder.—Transient buyers find some difficulty in obtaining prime Liverpool bleach, as regular consumers are taking pretty nearly all that arrives. Other brands, however, can be had in odd lots, but sellers are firm in their views. Contract prices remain $1.25 per 100 lb. for prime British and American, and $1.20@$1.25 for Continental. Off-test grades are offered at lower prices.

Caustic Soda.—Domestic high test for 1905 delivery has sold in appreciable quantities at $1.75@$1.80 per 100 lb., f. o. b. works, and 60% at $1.85@$1.90.

Copper Sulphate.—In one week recently 97,216 lb. were received at Philadelphia and Newport News from Liverpool, England. At the average f. o. b. price abroad, this copper sulphate was equivalent to $3.79 per 100 lb. Adding the duty of 50c. per 100 lb., there is a sufficiently large margin on the selling price here to pay the ocean freight rate, etc., and still leave a fair profit. Current New York quotations are based on $5.10 per 100 lb. Exports by domestic makers are being made at less, and recently orders for Italy have been taken at an average of $4.66 delivered, and for Austria and France at about $5, delivered. Some of the shipments made to France are intended for Algeria, where from 2,500 to 3,000 tons are consumed every year. Why do exporters not cultivate the Algerian trade by communicating with M. Buisson, secretaire de la presidence du Tribunal de Commerce, Algiers, and with the respective presidents of the chambers of commerce at Oran, Bone, Constantine, and Philippeville? When writing in French quote in francs and centimes and use metric weights.

Acids.—Firm. Contract deliveries are moderate.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.50	bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23.00
Nitric, 42°	5.50		

Brimstone.—It takes a microscope to find a buyer outside of regular customers, and even they are not requesting specially large deliveries. Practically nothing has been done in spot, while shipments of best unmixed seconds are quoted at $22 per ton, and thirds, $21.25.

The average monthly prices of brimstone as quoted by importers at New York are:

			—Two months—	
Best seconds:	Jan.	Feb.	1904.	1903.
Spot	$22.69	$22.78	$22.735	$23.365
Shipments	22.23	22.25	22.240	22.575
Best thirds:				
Spot	22.19	22.28	22.235	22.085
Shipments	21.73	21.75	21.740	21.290

It is noteworthy that the falling off in the value of best seconds has been made up by the higher prices asked for there, owing partly to the improvement in their quality.

Equally interesting is the comparison of prices, f. o. b. Sicily and ocean freights to Atlantic ports in the first two months of this and last year:

			—Two months—	
	Jan.	Feb.	1904.	1903.
	s. d.	s. d.	s. d.	s. d.
Best seconds, bulk	82 3	81 3	81 9	83 1½
Best thirds, bulk	79 9	78 3	79 0	79 6
Freights, average	7 0	7 3½	7 1¾	7 8¼

Judging from the reduction of 1s. 4½d. (33c.) per ton in best seconds, and of 6d. (12c.) in thirds, the Sicilian syndicate begins to feel the effect of heavy stocks and increased competition with pyrites.

Pyrites.—Ocean freights from Huelva, Spain, to Atlantic ports are based on 9s. ($2.16). Business is pretty good at unchanged prices.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@ 52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Evidently the systematic propaganda among agriculturists is bearing good fruits. Consumption continues to grow, and the scarcity of 96% quality, heretofore constituting the imports into the United States has necessitated the introduction of 95% quality. The ordinary quality by the way, makes up the bulk of European imports. The difference in price between the two qualities is small, seldom more than 2d. (4c.) per qtl., frequently less. Prices are advancing, $2.20 per 100 lb. being quoted now for spot in New York and Baltimore, while futures are worth $2.10@ $2.125. The market on the west coast is strengthening, apparently because future production is likely to be kept down by the limited labor supply. Ocean freights are hardening.

The statistical position of nitrate of soda in Europe in February and the two months of this year and last, is shown below, in long tons:

		—Two months—	
	February.	1904.	1903.
Exports to Europe	106,827	197,059	190,346
Imports	104,570	265,180	238,080
Deliveries	192,010	258,790	269,490
Loading for Europe, March 1	....	27,805	39,772
Visible supply, March 1	....	572,720	582,170

Notable changes this year are a decrease of 10,700 tons in deliveries for the two months, and a falling off of 9,350 tons in the visible supply on March 1. The smaller deliveries have been due partly to restricted consumption as a result of heavy rains in agricultural districts.

Sulphate of Ammonia.—Deliveries are moderate. Gas liquor is worth $3.175@$3.20 per 100 lb.

Phosphates.—Some fair sized orders for Europe have been taken on basis of quotations below, but sellers are not anxious to book for long-time deliveries while the freight is so uncertain. Recent charters to the Continent have been taken at fully 1s. advance, and it appears likely that more will soon be asked by ship owners. In February Savannah exported 13,186 tons Florida high-grade rock, principally to Germany, making 16,822 tons, for the two months, as against 15,801 tons last year. Domestic shipments from Peace river, Fla., are growing, and in February amounted to 12,695 tons. Since January these shipments totaled 17,570 tons, which, by the way, is considerably more than was reported in 1901, before the fire.

Abroad miners are preparing for an increased production. In Algeria the new deposits at Zailou, Sidi-Aissa, Seghvali and Khendek Zoungal, in the Commune of Nedromah, province of Oran, are to be developed by the Zailou Phosphate Co., capitalized at £100,000, just incorporated. British investors are interested in the enterprise.

The ocean freight rates are about as follows:

	—Shipping ports—		
	Florida.	So. Carolina.	Algeria.
Baltic	$3.66@$3.74	$2.26	....
Continental	2.76@ 3.00	....	2.16@ 2.22
Mediterranean	3.36@ 3.60	....	1.80
United Kingdom	2.64@ 3.12	2.40@ 2.55	1.86@ 2.04

Prices for phosphates per ton are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%....	$6.50@ 7.00	$9.84@$10.83
land pebble, 68@73%..	3.75@ 4.00	7.35@ 8.05
†Tenn, 78@80%.....	4.00@ 4.25	9.54@ 10.56
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.25	.....
river rock, 55@60%.	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	6.98@ 7.65
58@63%	.....	6.20@ 6.66
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.05@ 6.65
Christmas Isle, 80@85%.....	.....	11.75@ 12.54
Ocean Isle, 82@88%.....	.....	12.11@ 13.60
Somme, Fr., 70@75%.....	.....	10.91@ 11.05
Bordeaux, Fr., 60@65%.....	.....	7.80@ 7.92
55@60%.....	.....	6.60@ 6.72
Liege, Bel., 60@65%.....	.....	7.18@ 7.29

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool, Mar. 8.

(*Special Report of Joseph P. Brunner & Co.*)

Following are shipments of bleaching materials and soda compounds during February, according to the Board of Trade returns just issued: Beaching materials to United States, 31,457 cwt.; other countries, 17,014 cwt.; total, 48,471 cwt.; soda ash, 113,365 cwt.; bicarbonate soda, 19,910 cwt.; caustic soda, 98,815 cwt.; soda crystals, 14,191 cwt.; saltcake, 67,217 cwt.; other sorts, 28,488 cwt.; total, 341,986 cwt.

Soda ash is moving off steadily at the usual range as to destination. For tierces nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s.; bags, 5s. per ton under price for tierces. Soda crystals are in fair demand at £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in better request and firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Bleaching powder is very slow of sale at nominally £4 5s.@£4 15s. per ton, net cash for hardwood packages as to destination. Bicarbonate soda is steady at £6 15s. per ton, less 2½%, for the finest quality in 1 cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia is still dropping, and £12 12s. 6d.@£12 15s. per ton, less 2½%, is about nearest spot range for good gray 24@25% in double bags, f. o. b. here.

Nitrate of soda is well maintained on spot at £10 7s. 6d. per ton for ordinary quality, up to £10 12s. 6d. for refined, in double bags, f. o. b. here, less 2½%.

METAL MARKET.

New York, March 16.

Gold and Silver Exports and Imports,

At all United States Ports in February and Year.

Metal	February.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$1,506,370	$732,614	$1,592,321	$1,324,181
Imports.	1,817,456	5,030,372	3,828,307	13,255,880
Excess	I. $311,086	I. $4,297,758	I. $2,235,986	I. $11,931,699
Silver:				
Exports.	3,866,514	3,801,869	7,444,395	8,419,996
Imports.	1,687,007	2,110,675	3,181,563	4,720,047
Excess	E. $2,179,507	E. $1,691,194	E. $4,262,832	E. $3,699,949

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending March 12 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$1,500	$71,621	$753,980	$3,694
1904.....	1,360,660	1,455,275	10,672,378	170,143
1903.....	1,008,551	1,435,620	4,074,283	150,755
1902.....	13,735,220	782,038	8,662,764	245,144

Business continues rather quiet, and the speculative markets remain practically dead. The effect of the Northern Securities merger decision in Wall street has been comparatively slight, as the nature of that decision was practically discounted some time ago. The decision does not affect mining stocks to any extent, nor does it specially affect the industrials. There have been shipments of about $1,000,000 in gold from New York to the Argentine Republic, principally on London account. These have been more than balanced by receipts of Japanese gold at San Francisco.

The foreign trade of the United States for the two months ending February 28 is reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1903.	1904.
Exports	$259,578,293	$260,922,932
Imports	167,797,032	171,380,887
Excess, exports	$91,781,261	$89,542,045
Add excess of exports, silver.....		3,699,949
Total		$93,241,994
Deduct excess of imports, gold.....		11,931,699
Balance of exports.....		$81,310,295

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending March 12, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts.....	$924,500,400	$997,399,000
Deposits	916,162,000	1,037,268,900
Circulation	42,937,700	37,962,600
Specie	164,747,800	219,135,100
Legal tenders	65,316,700	70,119,200
Total reserve	$230,064,500	$289,254,300
Legal requirements	229,040,500	259,317,225
Balance surplus	$1,024,000	$29,937,075

Changes for the week this year were decreases of $2,519,400 in loans and discounts, $3,324,900 in deposits, $1,206,900 in circulation, $57,300 in specie, $780,200 in legal tenders, and $6,275 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd—	$164,747,800	.....	$219,135,100	.....
England—	178,707,125	.....	177,044,440	.....
France—	503,434,360	$218,947,140	467,094,630	$221,555,860
Germany—	170,960,000	60,065,000	172,730,000	60,690,000
Spain—	72,210,000	99,500,000	73,075,000	99,510,000
Netherlands—	23,491,500	32,912,500	27,198,500	33,183,500
Belgium—	16,186,690	8,093,335	16,163,335	8,081,665
Italy—	87,630,000	10,916,000	110,405,000	18,857,500
Russia—	395,385,000	39,225,000	456,385,000	40,630,000
Austria—	230,950,000	64,280,000	235,630,000	63,640,000

The returns of the Associated Banks of New York are of date of March 12, and the others March 10, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market is very sensitive and could easily turn either way. At present orders are just sufficient to keep the price barely steady, but special orders might easily turn the rates.

The United States Assay Office in New York reports receipts of 14,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to March 3 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£1,540,400	£2,714,039	I. £1,173,639
China	106,500	71,000	D. 35,500
Straits	128,491	58,103	D. 70,388
Total	£1,775,391	£2,843,142	I. £1,067,751

Receipts for the week were £200,000 in bar silver from New York, and £1,000 from Australia; also £10,000 in Mexican dollars from New York; total £211,000. Shipments were £78,000 in bar silver to Bombay, and £5,000 to Calcutta; also £55,000 in Mexican dollars to Bombay; total, £138,000.

Indian exchange has been somewhat easier, the demand for money in India having decreased, while the supply is good. The Council bills offered in London were all taken, however, at an average of 16.06d. per rupee. Buying of silver for India has been comparatively moderate, but an increased demand arising from the war in China begins to be apparent.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$0.45	$0.48½
Peruvian soles and Chinese pesos.....	.42	.45
Victoria sovereigns.....	4.85½	4.87
Twenty francs.....	3.85	3.87
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

March	Silver—New York, Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
10	57⅜	26 7/16	12¼ @12⅜	12 @12¼	57	28¼	4.45 @4 50	5.00	4.80
11	57½	26⅛	12¼ @12⅜	12 @12¼	57⅛	28½	4.45 @4.50	5.00	4.80
12	57	26 5/16	12¼ @12⅜	12 @12¼	....	28½	4.45 @4.50	5.00	4.80
14	57	26 5/16	12¼ @12⅜	12 @12¼	57⅛	28⅛	4.45 @4.50	5.00	4.80
15	56⅝	26⅛	12¼ @12⅜	12 @12¼	57¼	28	4.45 @4.50	5.00	4.80
16	56⅞	26¼	12¼ @12¼	12 @12¼	57⅛	28	4.45 @4 50	5.00	4.80

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

March 10.....	4.86½	March 14.....	4.86⅝
" 11.....	4.86½	" 15.....	4.86¾
" 12.....	4.86⅝	" 16.....	4.86⅞

Copper.—The feature of the week has been the continued heavy exports. It seems that business abroad remains very satisfactory indeed, while consumers over here are only covered for their early requirements. The tone of the market is quite firm, and the closing quotations are given as 12¼@12½ for Lake; 12@12¼ for electrolytic copper in ingots, cakes and wirebars; 11¾@12c. for cathodes; 11¾@12c. for casting copper.

The market for standard copper in London, which closed last week at £57, opened on Monday at £57 10s., and the closing quotations on Wednesday are cabled as £57 2s. 6d.@£57 5s. for spot, £56 2s. 6d.@56 5s. for three months. Statistics for the first half of March show a decrease in the visible supplies of 600 tons.

Refined and manufactured sorts we quote: English tough, £59 10s.@£60; best selected, £60@£60 10s.; strong sheets, £70@£70 10s.; India sheets, £68@£68 10s.; yellow metal, 6⅛d. @6¼d.

Exports of copper from New York, Philadelphia and Baltimore in the week ending March 15 were 5,905 tons, principally to Germany and Great Britain. Imports were 710 tons copper from Mexico and Great Britain, and 2,200 tons ore from Cuba.

Tin ruled very firm indeed at the end of last week, as high as 28½ being paid for spot tin. In the meantime there has been a decided easing off, and the closing quotations are given as 28, spot, and 27½ for futures.

The foreign market, which closed last week at £126 15s., opened on Monday at £127 7s. 6d. and declined on Tuesday to £125 17s. 6d. The closing quotations on Wednesday are cabled as £126@126 2s. 6d. for spot, and £125 17s. 6d@£126 for three months.

Lead is quiet but steady, without any special feature. The closing quotations are given as 4.45@4.50 New York, 4.37½@4.42½ St. Louis,

The foreign market is somewhat easier, Spanish lead being quoted at £11 18s. 9d., English lead £12 1s. 3d.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs as follows: Lead is quiet, but prices remain nominally unchanged. Sales reported at $4.40@$4.42½ for Missouri brands.

Spelter has been in very good demand, and the market has developed considerable strength. The closing quotations are given as 4.80 St. Louis, 5c. New York.

The foreign market is somewhat easier, good ordinaries being quoted at £21 17s. 6d., specials £22 2s. 6d.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is strong and fairly active. The latest sales reported are on a basis of $4.80@$4.82½, East St. Louis.

Silesian Spelter Market.—Herr Paul Speier writes from Germany, under date of February 29, that the market is generally firm. Quotations are 21.60@21.75 marks per 50 kg., f. o. b. cars at Breslau. This is equivalent to 4.7c. per lb., for standard brands. Zinc dust is quiet; current quotations are 40.50@41 marks per 100 kg., delivered at Stettin. Exports of spelter from Germany in January were 4,954 tons; zinc sheets, 1,122 tons.

Antimony is quiet and unchanged. The ruling quotations are: 7¾@8c. for Cookson's; 6¾@7c. for Hallett's; 6⅝@6⅝ for United States, Japanese, Italian, French, Hungarian and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price is firm at $18.50 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Iridium.—During the past month an increase has been reported in the prices of this metal, second in commercial importance of the platinum group. This fact is of particular importance to the electrical, chemical and dental industries, which are extensive consumers of the alloys of iridium and platinum. The rise is due to recent reports indicating a shortage in the supply of the metal, while the demand is increasing.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders, and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—According to Herr Paul Speier metallic cadmium is in good demand. Metal containing 99.5% cadmium sells at 700 marks per 100 kg., delivered in Berlin or Hamburg.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-Tungsten (37%)	.38c.
No. 2, 90% ingots	31@34c.	Magnesium, pure (N. Y.)	.60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	.32c.
Nickel-alum	34@39c.	Mangan'e Cop. (30% Mn)	.38c.
Bismuth	$2.10	Molybdenum (Best)	$2.00
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	.45c.
Copper, red oxide	50c.	Phosphorus, American	.70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	.88c.
Ferro-Titanium (20@25% N. Y.	55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market. March 12.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore during the week was $39.50 per ton for two bins of ore choice in grade and in concentration. Both these bins assay over 64% zinc. Another bin of ore equal in quality, but not so well concentrated, sold at $38.50. The assay basis has advanced $1, to $36 per ton of 60% zinc. Readers need only refer to the report published in the issue of March 3 of the JOURNAL to recall that in presenting the market conditions in that issue it was pointed out that the situation had reached a point when advances in the zinc ore market must come from force of circumstances, and it was indicated that these must come soon and perhaps follow one another quickly until zinc had reached a higher plane of prices. Advances of 50c. to $1.50 per ton were numerous this week. The ore has now reached a higher level, occasioned by the natural causes—an unusually large demand on account of new purchasing agents entering the field for the old coal smelters starting up, and the prospective increase in purchases to follow soon from the greater smelting capacity in the natural gas regions of Kansas. The demand for zinc ore is over 500 tons a week larger than at this time a year ago, and this week was 1,350 tons greater than the average shipment in January of this year. The average shipment for four months ending February 1 was 4,200 tons per week. Last week's shipment was 1,547 tons greater. With a demand larger than a year ago and much stronger than during the winter, it is clear where the reserve stock has gone. So far no purchases have been reported made for the coal smelters being repaired at Pittsburg, but shipments have been made to Nevada preparatory to starting there the coming week. Unless the new smelters at Caney and Altoona are to blow in on western zinc, it will be necessary for them to have Joplin ore to start with, and these are to start in April. For two weeks one smelting company has been practically crowded out of the market by other purchasing agents overbidding the offers of these buyers. None of the smelters seem to be securing more than is needed, as so many of them have held back so long on purchases, running the reserve at the works to a low point. These are some of the manifestations of the acuteness of the zinc ore situation in the Joplin district. That this should not have come sooner is attributable only to the heavy output the past six weeks. This has kept the reserve from being entirely wiped out, but now leaves only small, scattering and, in the main, undesirable lots of ore. Output has averaged 5,270 tons per week for six weeks, and the shipments averaged 5,530 tons, taking up in that time 1,300 tons more than was produced. New smelting works and increased capacity of old works caused the larger demand, and a number of operators are mining and milling double shifts in order to help meet the greater demand. The review of the past six weeks shows that even this effort does not meet it. Paying prices now current would indicate that the smelters must have more money for their metal, and that very soon. As yet the metal market has shown no tendency to respond, but it is a safe guess to say that it will step up, and perhaps lively, before March ends.

Lead was generally advanced $1 per ton, closing the week at $58 per ton, one extra choice lot bringing $60.50 per ton, and several bins sold at $1 to $1.50 above the market. The lead advances are created by local competition, nothing being apparent in the metal situation to warrant such changes.

Following are the shipments of zinc and lead and the values of the various camps of the Joplin district reporting sales for the week:

	Zinc lb.	Lead lb.	Value.
Joplin	3,424,610	392,890	$73,035
Carterville-Webb City	2,108,340	421,730	45,965
Duenweg	1,185,240	146,280	24,980
Galena-Empire	905,750	176,240	20,055
Aurora	699,740	3,710	11,380
Alba-Neck	624,370	.....	11,240
Granby	696,000	38,000	9,940
Carthage	324,300	.....	5,835
Oronogo	290,700	14,040	5,410
Prosperity	218,700	28,340	4,755
Reeds	220,870	.....	3,755
Mitchell	62,630	62,860	3,090
Badger	128,570	8,830	2,575
Carl Junction	123,710	7,990	2,520
Spurgeon	183,070	19,410	2,255
Beef Branch	33,310	82,520	2,115
Cave Springs	76,810	15,510	1,830
Zincite	95,710	.....	1,720
Central City	46,880	9,450	1,000
Stotts City	44,220	.....	750
Totals	11,493,630	1,427,800	$324,205
Eleven weeks	110,302,900	13,776,150	$2,026,370
Zinc value, the week,	$193.720; eleven weeks,		$1,827,000
Lead value, the week,	40,485; eleven weeks,		379,340

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.62	55.56	21.98	45.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June.	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.31	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb..	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June.	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec..	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1503.	1904.	1903,	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.338	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.: February, 4.717c.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
Alaska Mexican	Mar. 5	.20	36,000	627,381
†Am. I. & St., pf.	Apr. 1	1.25	37,500	675,000
‡Am. Ag. Chem., pf.	Apr. 1	3.00	544,050	5,214,810
†Am. S. & R., com.	Apr. 20	1.25	625,000	1,250,000
†Am. S. & R., pf.	Apr. 5	1.75	875,000	14,141,533
†General Chem, pf.	Apr. 1	1.50	150,000	2,875,178
*Homestake, S. D.,	Mar. 25	.25	54,600	12,531,550
†Iron Silver, Colo.	Apr. 1	.10	50,000	2,950,000
Mines Co. of Am.	Mar. 20	.01¼	25,000	530,000
N. Y. & Hond. Rosario	Mar. 19	.10	15,000	1,800,000
*Pacific Cst. Borax.	Mar. 29	1.00	19,000	1,592,500
‡Penna. Salt	Apr. 15	3.00	180,000	13,630,000
†Sloss-Sheffield, pf.	Apr. 1	1.75	114,000	1,938,000
†Tenn. C. & I., pf.	May 2	2.00	4,960	317,024
†Va.-Car. Chem., pf.	Apr. 15	2.00	240,000	7,500,869
‡Wolverine Copper.	Apr. 1	3.50	210,000	1,530,000

* Monthly. † Quarterly. ‡ Semi-annually.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Brunswick Con., Cal.	Apr. 5	.....	$0.03
Chollar, Nev.	Apr. 12	.....	.10
Comstock, Utah	Apr. 6	Apr. 25	.10
Dexter Tuscarora, Nev.	Apr. 8	Apr. 21	.07
Exchequer, Nev.	Apr. 11	May 2	.05
Grizzly, Cal.	Apr. 4	.....	.10
Great Buffalo, Utah	Apr. 2	Apr. 20	.01
Overman, Nev.	Apr. 12	.....	.10
Jackson Butte, Cal.	Apr. 18	.....	.01
Julia Con., Nev.	Apr. 13	.....	.03
Potosi, Nev.	Mar. 16	Apr. 7	.10

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 12 H.	Mar. 12 L.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.	Sales.
Acacia	$1													
Amalgamated, c	100	46⅜	45⅛	45⅜	45½	45⅝	45⅛	45¼	44⅜	46¼	44⅜	45⅞	45⅜	98,105
Anaconda, c	25			65		62								750
Andes, s	1	45												200
Belcher, s	3													
Best & Belcher, s	3													
Brunswick, g	5													
Bullion, s	1					11								500
Caledonia, s	1			1.15				1.20				1.20		500
Challenge, s	2½													
Chollar, s., g	2½	19												300
Confidence	3													
Con. Cal. & Va., g. s	2½	1.60		1.70		1.70						1.65		700
Con. Imperial, s	1													
Cripple Creek, g	1													500
Crown Point	2½					06								200
C. K. & N., g	1					21								
Dunkin, s	1							05						300
Elkton, g	1	70												300
El Paso, g	1													
Gold Dollar, g	1	66	05	06	05									2,100
Gould & Curry	1					46	45							800
Greene Con., c	10	10⅛		10¼	10⅛	10¼	10⅛	10¼	10⅛	10⅛		10¼	10⅛	3,105
Hale & Norcross	3											90		200
Homestake, g	100													
Horn Silver	20													
Isabella, g	1											29	28	500
Jack Pot, g	1							07						1,000
Julia, s	1					05								300
Justice, s	2	09		09										1,000
Little Chief, g. s	50							08						500
Mexican, s	3	1.75						1.85				2.00		400
Mollie Gibson, g	5													
Moon Anchor, q	3													
Occidental, s	3													
Ontario, s. l	100			4.25								4.20		60
Ophir, s	3	4.60		4.65		4.80	4.75							400
Overman, s	2					25								400
Pharmacist, g	1													
Phœnix, g	1											08		800
Portland, g	1			1.85				1.85				1.85		300
Potosi, s	1													
Quicksilver, Pf	100													
Savage, s	3	70	69	74		75		73						900
Sierra Nevada, s	3	60		67										600
Silver Hill, g. s	1	72				73								300
Small Hopes														
StandardCon., g. s	10			2.65		2.60								200
Tennessee, c	25	32	31											1,510
Union Con., g. s	1							84						100
Union Copper	10	1/16								9/16		9/16		1,700
United, com., c	100													
Utah, s	1													
White Knob, c	10	9	8	8¾	8½	8½					8	8¼		1,920
Work, g	1											08		1,000
Yellow Jacket, s	3					32								200

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 123,650 shares. † Ex-dividend.

BOSTON, MASS.

Company.	Par val	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 12 H.	Mar. 12 L.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.	Sales
AdventureCon., c	$25	2¼	2 1/16	2¼										195
Aetna q														
Allouez, c	25	3⅜								3⅜	3⅝	3¾		750
Amalgamated, c	100	46⅛	45⅜	45⅞	45⅝	45⅞	45¼	45½	44⅜	46⅛	44⅜	46⅛	45⅛	13,044
Am. Gold Dredg	5											1		100
Am. Z., L. & Sm	25													
Anaconda, c. s	25			16¼										15
Arcadian, c	25									50				
Arnold, c	25													
Atlantic, c	25			7⅛		7⅛		8				8		145
Bingham Con	50					19⅛		19		19¼	19¾	19¼		525
Bonanza Dev. g	10			43										200
British Col., c	5													
Calumet & Hecla	25			445	440							450		22
Centennial, c	25			17		17				17		16⅞		210
Central Oil	25			7⅛						7¼				255
Con. Mercur, g	5	65		66	65	65		65						1,715
Copper Range	100	40¼	39½	40	39½	40¾	39½	40¼	39½	40½	39½	41¼	40½	8,179
Daly West, g. s. l	20	34⅛	34⅛	33¾		33½	33¼	33⅜	33¼	33⅝	31¾	31⅞	28½	3,368
†Dominion Coal	100	52¾		54½	53½	54	53	53½	53	54		55	54½	975
Preferred	100													
Dominion I. & S	100					7⅞		8	7⅞	8⅜		8¼	8	380
Elm River, c	12													
Franklin, c	25					8						7½	7⅜	175
Granby Con	10			3⅜						3¼		3¾		800
Guanajuato Con	5	75	73	80		90	80	99	90	95		95		4,125
Isle Royal Con	25					8				7½				275
Mass Con., c	25	3½				3½		3¾		3¾	3½	3¾		210
Mayflower, c	25	55									55	50		650
Michigan, c	25											4¾		10
Mohawk, c	25													
Mont. Coal & C	25													
Mont'l & Boston	5													
New Idria, q	5													
Nova Scotia St	100													
Preferred	100													
Old Colony, c	25					1								10
Old Dominion, c	25	10												50
Osceola, c	25	56½	56			56				57		57	56	100
Parrot, s. c	10	22¼				23	22½			22½		22½	21¾	465
Phœnix Con, c	25	1¾						1¾	1½	2	1 15/16			340
Quincy, c	25			82		82		83		84		85	84	110
Rhode Island, c	25			1										31
Santa Fe, g. c	10									1⅜				25
Shannon, c	10	7⅛		7 1/16	7⅛	7 1/16				7⅞	7⅜	7⅞	7⅝	1,235
Tamarack, c	25	92½								97½	90	95	94	70
Tecumseh, c	25													
Tennessee, c	25													
Trinity, c	25			4½		4⅝		4¾	4⅝	4⅝		4⅝	4½	697
United c	100													
United States, g	10	20⅜		20¼		20⅜	20⅛	20		20⅜	20¼	21½	20⅝	5,322
U. S. Coal & Oil	25					8¾								122
Utah Con., g. c	5	34⅛	3 1/16	34¼	34	34	33¾	34	33⅝	34⅛	33¼	34¼	33¾	3,889
Victoria, c	25	3⅝	3	3						3		3⅛		205
Winona, c	25							6		6		5⅞		195
Wolverine, c	25	75	74	74½		74¾		74½		74½	74	74½	74	240
Wyandot, c	25	60	55							52				150

*Holiday. †Ex-dividend. ‡Assessment Paid. Total sales, 49,554 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth	10	50.00	51.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Dev	10	3.00		Wolv. & Arizona	10	4.00	
Junction Dev	10	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 12 H.	Mar. 12 L.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.	Sales
Allis-Chalmers	$100	12										9		250
Preferred	100	51				51	50	50						621
Am. Agr. Chem	100													
Preferred	100													
Am. Sm. & Ref	100	47⅝	47⅜	47⅞	47¼	47	46¾	46½	46	47	46	47½	47	3,925
Preferred	100	90⅜		91		91⅛	91⅜					91¼		700
Col. Fuel & I	100	28½	28	28		27⅛	27	26½	25½	28⅛	25⅝	29	27	2,170
Preferred	10													
Col. & H. C. & I	100	12	11⅞					11⅝		11⅞				470
*Crucible Steel	100			4				4		4	3⅞	4		430
*Preferred	100					28¼		28¼		28¼		29	28½	294
General Chem	100											48⅜		100
Preferred	100													
*Mong. R. Coal	50													
*Preferred	100							24⅜		24⅜	24⅜			145
National Lead	100	14⅜		24¼				14⅜		14⅝		15	14¼	1,210
Preferred	100	84¼												300
*Phila. Nat. Gas	100											38⅜		50
‡Preferred	100													
*Pittsburg Coal	100	15¼	14	15½	15½	15¾		15⅛				16⅛	15¾	1,174
*Preferred	100	50⅜	48¾	51¼	50¼	53	52¼	52⅞	52½	53	52¾	54	53	2,487
Republic I. & S	100	7⅜								7½		7⅛		400
Preferred	100	41⅜				42	41⅞	42		42		42¼		2,820
Sloss-Shef S. & I	100	36	35¾			37	36⅞	37		37½	36	38¾	37¾	2,120
Preferred	100											80		100
‡Standard Oil	100	625	620½	625		615				620		620		29
Tenn. C. I. & R. R	100	36¼	35⅜			35½	35	35		38¼	36	37¾	35½	2,700
U.S. Red. & Ref	100													
Preferred	100													
U.S. Steel Corp	100	10⅜	10⅜	10⅞	10⅜	10⅜	10½	10⅜	10½	11	10⅜	11¼	10⅜	17,680
Preferred	100	55⅜	55⅛	56	55⅜	55⅜	55⅛	55⅛	55¼	56¼	55⅛	56⅜	55⅜	104,883
Va.-Car Chem	100	30	29½	29½		29				29	28⅜	31½	30½	2,260
Preferred	100					106						105		110

*Pittsburg exchanges. †Holiday. ‡Ex. dividend. Total sales, 147,438.

COLORADO SPRINGS, COLO.

Company.	Par Val	Mar. 5 H.	Mar. 5 L.	Mar. 7 H.	Mar. 7 L.	Mar. 8 H.	Mar. 8 L.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Sales
Acacia	$1	.06		.06⅝	.06⅛	.06½	.06⅛	.06⅜	.06	.06⅛	.06	.06½	.06	4,000
American Con	1													
Anaconda	5	.16	.15	.16	.15	.16		.16¼	.15	.16	.15	.15½		3,000
Colo. City & M	1	.03	.02¾	.02⅞	.02¾	.02⅞	.02¾	.03	.02¾	.02⅞	.02½	.03	.02½	9,000
C. K. & N	1	.19½	.19	.19		.19		.19		.20	.19	.20	.19	3,000
Cripple Ck. Con	1	.07⅜	.07⅝	.07⅞	.07½	.07⅜	.07¼	.07⅜	.07	.07¼	.06	.07	.06⅞	11,500
Des Moines	1	.02⅛	.02⅛	.02⅛	.02	.02⅛	.02	.02⅛	.02	.02⅜	.02	.02⅛	.02	
Doctor Jack Pot	1	.09½	.07	.09	.08	.03½	.09	.08⅛	.07½	.09	.07⅜	.08⅛	.07⅛	
Elkton Con	1	.68	.67¾	.68	.67	.67	.66½	.66	.65	.64⅞	.64½	.64¼	.64⅛	23,636
El Paso	1	.75½	.75	.75	.72½	.73½	.72½	.72	.71⅝	.72	.71	.74½	.73	30,700
Gold Dollar Con	1	.05⅛	.04¾	.05	.04⅞	.05⅛	.04¾	.05	.04⅞	.05⅛	.04¾	.05⅛	.05¼	5,000
Gold Sovereign	1	.04	.03⅞	.04	.03⅞	.04	.03⅞	.03⅞	.03⅝	.04	.03¾	.04	.03⅞	9,000
Golden Cycle	1	.51		.51		.55	.51	.52	.50	.52	.49½	.51	.49	
Golden Fleece	1	.02		.02		.02		.02		.02		.02		
Hart	1	.02¾		.02½		.02½		.02½		.02½		.02		
Isabella new	1	.35	.32	.34	.32	.34	.32	.34	.32	.34	.32	.33	.32	1,750
Jack Pot	1	.06⅛		.08½	.06½	.09¼	.06	.09	.06					
Keystone	1	.04⅜	.04	.04¼	.03⅞	.04¼	.03⅞	.04	.03¾	.03⅝	.03⅝			
Last Dollar	1	.45		.45		.45		.45		.45		.45		
Lexington	1	.04½	.04	.04⅜	.04⅛	.04⅜	.04	.04⅜	.04	.04½	.04	.04⅜		
Little Puck	1	.03½	.03¼	.03½	.03	.03	.02¾	.03	.02½	.02⅞	.02¾	.02¾	.02⅝	4,000
Mollie Gibson	1	.07	.05½	.05¼		.07	.05	.06	.05	.07		.07	.04¾	9,000
Moon-Anchor	5	.11	.09½	.11		.11		.11		.10½		.09½		
New Haven	5	.02⅞	.02½	.02¾	.02½	.02⅝		.02⅝	.02⅜	.02⅝	.02⅜	.02⅝	.02¼	5,000
Old Gold	1	.10	.09	.10	.09	.09¾	.09⅜	.09½	.09	.09½	.09	.09⅝	.09	5,000
Pharmacist	1	.04½	.04	.04½		.04⅜	.04	.04⅜	.04¼	.04½	.04	.04½	.04⅛	
Pinnacle	1	.04½		.03½	.02	.03¼	.02½	.04		.04		.04		1,000
Portland	1	1.85	1.60	1.90	1.50	1.90		1.85	1.50	1.68	1.50	1.80	1.70	3,000
Vindicator Con	1	.63	.60	.80	.58	.61	.58	.61	.59	.65	.58	.65	.58	4,000
Work	1	.06¾	.06½	.06½	.06⅝	.06⅛	.06⅛	.06⅛	.06⅛	.06⅛	.05⅞	.06⅛	.06⅛	7,000

Total sales, 137,986 shares.

COLORADO SPRINGS (By Telegraph).

Company.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.	Company.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.
Anaconda	.15	.13	.15	.13	Jack Pot	.09	.06	.09	.06
Cripple Ck Con	.06⅞	.06¾	.06¾	.06⅝	Last Dollar	.45	.40	.45	.40
C. K. & N	.19½	.19	.19½	.19	Mollie Gibson	.03½	.03¼	.03½	.03¼
Doctor-Jack Pot	.08	.07⅛	.08	.07	Moon Anchor	.11	.08	.10	.08
Elkton Con	.65	.63½	.63	.62½	Old Gold	.09⅜	.09	.09½	.09
El Paso	.73½	.72½	.73½	.72	Pharmacist	.04½	.04	.04½	.04
Gold Dollar Con	.05¾	.05⅛	.05¼	.05⅛	Portland	1.80	1.70	1.80	1.70
Gold Sovereign	.04¼	.03⅞	.04¼	.04	Vindicator	.66	.60	.66	.60
Isabella	.32	.29	.32	.28	Work	.06⅜	.06⅛	.06½	.06

SAN FRANCISCO.

Company.	Location.	Mar. 3 H.	Mar. 3 L.	Mar. 4 H.	Mar. 4 L.	Mar. 5 H.	Mar. 5 L.	Mar. 7 H.	Mar. 7 L.	Mar. 8 H.	Mar. 8 L.	Mar. 9 H.	Mar. 9 L.	Sales
Central Eureka	Cal									.81				500
Golconda	Ore													
Golden Anchor	Nev													
Hannapah	Nev													
Lightner Mg. Co.	Nev													
MacNamara	Nev			.19				.18		.18		.18		1,700
Mont. Tonopah	Nev	1.30	1.27½	1.30	1.27½	1.27½	1.25	1.25	1.20	1.22½	1.20	1.20		12,500
Penna. C. M. Co	Cal													
South Eureka	Cal													
Ton. Belmont	Nev	.61	.59	.63	.60			.60		.57		.60	.59	4,400
Ton. Midway	Cal	.36		.42	.40					.40		.39		5,300
Ton. Mg. Co	Nev													
Ton. North Star	Nev	.32	.31	.33				.33						2,600
Ton. & Salt Lake	Nev													
Ton. Superior	Nev													
Wild Goose	Ala	2.50												400

San Francisco and Tonopah Mining Exchange.
Total sales, 27,400 shares.

SAN FRANCISCO (By Telegraph).

Company.	March 14.	March 15.	Name of Company.	March 14.	March 15.
Belcher	.22	.25	Gould & Curry	.42	.48
Best & Belcher	2.05	2.20	Hale & Norcross	.50	.83
Caledonia	1.15	1.15	Mexican	1.90	2.00
Challenge Con	.35	.34	Ophir	4.65	5.00
Chollar	.19	.19	Overman	.25	.26
Confidence	1.05	1.05	Sierra Nevada	.63	.64
Con. California & Virginia	1.75	1.80	Union Con	.85	.85
Crown Point	.22	.22	Yellow Jacket	.35	.35

STOCK QUOTATIONS

MEXICO.* Mar. 4

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos	2,400	50	55
Cinco Senores y An., aviadoras	2,000	55	60
Cinco Senores y An., aviada	400	58	65
Providencia, SanJuan de la Luz	6,000	60	65
Queensland y Australia	300	50	75
Guerrero:			
Delfina, 1st serie	2,500	52	55
Delfina, 2nd serie	2,500	35	40
Garduno y Anexas	7,200	30	40
Hidalgo:			
Amistad y Condordia	9,900	81	82
Carmen, aviada	1,100	50	60
Guadalupe Fresnillo Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,538	.....	.....
La Blanca, aviada	768	.....	.....
La Reina y An., aviadora	5,600	9	12
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	14	20
Real del Monte	2,554	.....	.....
Refugio, aviada	12,800	5	7
Santa Anay An., aviadora	1,800	85	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	83	84
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	17	19
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,690	1,700
San Rafael y An., aviada	1,200	675	685
Soledad, aviada	670	670	680
Sorpresa, aviada	960	680	300
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran	2,400	20	28
Aldebarren	2,000	35	45
Buen Despacho	3,000	32	38
Dos Estrellas	3,000	1,000	1,050
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	20	25
Providencia, pagadoras	1,600	.....	.....
Providencia, liberadas	900	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	60	65
Luz de Borda, aviado	1,000	38	40
Santiago y An., Tlal	4,000	4	6
Nuevo Leon;			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An	3,000	65	75
El Barreno, aviadora	2,000	44	48
Sta. Maria de la Paz	9,800	150	152
San Diegoy Annexas	2,400	8	10
Zacatecas:			
Asturiana y An	2,500	20	30
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An	2,400	6	8
Lourdes	2,500	22	27
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	50	55
Nueva Quebradilla, aviadas	600	50	70
San Carlos y Annexas	2,500	55	65
Sta. Maria de Gaud	2,500	60	70
Miscellaneous:			
Bartolome de Medina	2,000	79	81
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca)	3,750	.....	.....
La Reina (Chihuahua)	192	.....	.....
Naica (Chihuahua)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	950	100
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac	6,000	64	70
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. March 12

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g	$1	.04	.02	.....
Cariboo-McKin	1	.03	.....	.....
Cariboo-Hydr	1	.70	.....	.....
Center Star, g. s	1	.29	.24	.....
Crows Nest, C.C	100	2.60	2.00	.....
Dominion Coal	100	.53½	.53	.....
Dominion S. & I.	100	.....	.....	.....
Fairview, g. s	1	.04	.02	.....
Giant, g. s	1	.....	.....	.....
Deer Trail, g. s	1	.02	.01	.....
Iron Mask, g. s	1	.06	.....	.....
Morrison, g. s	1	.04	.02	.....
.....	.....	.....	.....	.....

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter	$10	4 20	3.70	.....
Mountain Lion, g.	1	.18	.12	.....
North Star, g. s	1	.08	.07	.....
Nova Scotia Steel	100	.....	.....	.....
Payne, s. l	1	.14	.09	.....
Rambler Carib	1	.35	.25	.....
Republic, g	1	.03	.02	.....
St. Eugene, g. s	1	.40	.30	.....
Virtue, g. s	1	.07	.06	.....
War Eagle Con	1	.14	.09	.....
Sullivan, g. s	1	.06	.04	.....
Winnipeg, g. s	1	.04	.....	.....
Wonderful, g. s	1	.03	.....	.....

g—Gold. l—Lead. s—Silver. Total sales, none.

SALT LAKE CITY.* March 12

Company	Par Val	High	Low	Sales.
Ajax	10	.06½	.05	4,750
Butler Liberal	.....	.10½	.10	4,135
Carisa	1	.07½	.07⅜	1,000
Century	1	63½	60	525
Con. Mercur	1	.75	.71½	400
Daly	20	2.00	2.00	50
Daly-Judge	.....	4.63	4.60	400
Daly West	½	34.10	32.80	725
Grand Central	.....	3.90	3.50	850
Egl. & Blue Bell	.....	.....	.....	.....
Ingot	1	.01¾	.01⅝	29,000
Joe Bowers	¼	.....	.....	.....
Little Chief	.....	.05½	.03	20,300
Little Bell	.....	1.30	1.00	50

Name of Company	Par Val	High	Low	Sales.
L. Mammoth	½	41	.40	2,400
May Day	.....	.06¼	.06	9,470
Mammoth	.....	.....	.....	.....
N. Y. Bonanza	5	.09¼	.08¼	12,400
Petro	.....	.....	.....	.....
Sacramento	1	.20	.21½	2,800
Silver Shield	1	.....	.....	.....
Star Con	.....	.17½	.17	2,400
Swansea	1	.....	.....	.....
Tetro	.....	.33	.32½	1,000
Uncle Sam, Con	1	.20½	.20	1,000
Wabash	1	1	¾	4,500
Yankee Con	.....	.48	.44	500

*By our Special Correspondent. All mines are in Utah. Total sales, 102,705 shares.

PHILADELPHIA, PA.

Company.	Par val.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 12 H.	Mar. 12 L.	Mar. 14 H.	Mar. 14 L.	Mar. 15 H.	Mar. 15 L.	Sales
Am. Cement	$10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria Iron	50	.....	.....	47	.....	.....	.....	47	.....	.....	.....	.....	.....	8
Cambria Steel	50	19¼	19⅛	19⅛	19⅛	19¼	.....	19¼	.....	19⅛	19⅛	19¼	.....	909
Pa. Steel, pfd	100	.....	.....	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Susq. I. & S.	5	.....	.....	.....	.....	⅝	.....	.....	.....	.....	.....	.....	.....	.....
United Gas I.	50	83	82⅞	83	82⅞	83	.....	82⅞	83⅛	82¾	82¼	83⅛	82⅛	1,333
Lehigh Nav'n	50	.....	.....	.....	.....	67	.....	67	.....	67	.....	67	.....	31
Philadelphia	50	38⅛	38	.....	.....	38⅛	38	38	.....	39¼	38¼	.....	.....	1,541
U.S. Steel	100	10¾	10⅝	10¼	.....	10⅞	10⅝	.....	.....	11¼	10¾	.....	.....	886
U.S. Steel. pf.	100	55¼	55⅛	55⅞	55⅛	55¼	55⅛	55⅞	55¼	56⅛	55½	56¾	55¾	7,710

†Ex-Dividend Total sales 12,525.

LONDON. Mar. 4

Company.	Shares Issued.	Par value. £.	s.	d.	Latest dividend. Amt. s.	d.	Date.	Quotations. Buyers. £	s.	d.	Sellers. £	s.	d.
American:													
Alaska-Treadwell	260,000	5	0	0	1	6	Feb., 1904	4	5	0	4	10	0
Anaconda	1,200,000	5	0	0	2	0	Nov., 1903	3	3	9	3	6	3
Camp Bird	820,000	1	0	0		9	Feb., 1904	1	2	6	1	5	0
Copiapo	112,500	2	0	0	6	10	May, 1903	1	5	0	1	10	0
De Lamar	80,000	1	0	0	2	0	Oct., 1903		8	9		11	3
El Oro	1,080,000	1	0	0		9	Jan., 1904	1	1	3	1	3	9
Frontino & Bolivia	128,682	1	0	0	3	0	July, 1901		3	9		6	3
Le Roi	200,000	5	0	0	5	0	Nov., 1899		17	6	1	0	0
*Le Roi No. 2	120,000	5	0	0	1	0	Feb. 1904		11	3		13	9
Montana	657,128	1	0	0		6	April, 1899			9		1	0
Standard	500,000		4	0		2½	Sept., 1903		3	0		4	0
Stratton Independence	1,000,007	1	0	0		6	Dec., 1903		3	9		4	3
St. John del Rey	548,285	1	0	0		6	Dec., 1903		14	0		15	0
Tomboy	300,000	1	0	0	1	0	June, 1902	1	5	0	1	10	0
Utah	300,000	1	0	0	6	3	Jan., 1904	6	10	0	6	15	0
Ymir	200,000	1	0	0	1	0	Mar., 1902		1	3		3	9
European:													
Linares	15,000	3	0	0	1	0	Mar., 1903	2	0	0	2	10	0
Mason & Barry	185,172	1	0	0	11	0	May, 1903	3	12	6	3	17	6
Rio Tinto	325,000	5	0	0	32	6	Nov., 1903	46	12	6	46	17	6
Rio Tinto, preferred	325,000	5	0	0	2	6	Nov., 1903	5	17	6	6	2	6
Tharsis	625,000	2	0	0	6	0	May, 1903	4	2	6	4	7	6
West Australian:													
Associated	495,388	1	0	0	2	0	Jan., 1904	2	12	6	2	13	9
Cosmopolitan	400,000	1	0	0	1	0	May, 1903		14	9		15	3
Golden Horseshoe	300,000	5	0	0	6	0	Nov., 1903	8	1	3	8	3	9
Great Boulder	1,750,000		2	0		9	Mar., 1904	1	6	0	1	6	3
Great Fingall	250,000	1	0	0	8	0	Jan., 1904	7	13	9	7	16	3
Ivanhoe	200,000	5	0	0	5	0	Jan., 1904	8	10	0	8	12	6
Kalgurli	120,000	1	0	0	2	6	Apr., 1904	5	8	9	5	11	3
Lake View	250,000	1	0	0	rts.		Aug., 1902	1	2	6	1	5	0
Oroya-Brownhill	450,000	1	0	0	2	6	Mar., 1904	3	15	0	3	16	3
Miscellaneous:													
*Brilliant Central	100,000	1	0	0	1	0	Mar., 1904	2	17	6	3	2	6
Briseis	600,000	1	0	0	..	..	.....		5	6		6	6
*Broken Hill	960,000		8	0	1	6	Feb., 1904	1	8	6	1	9	6
Mt. Lyell	275,000	3	0	0	4	3	Sept., 1903		14	6		15	6
Mt. Morgan	1,000,000	1	0	0		3	Mar , 1904	1	13	9	1	16	3
Waihi	497,412	1	0	0	2	6	Mar., 1904	5	2	6	5	5	0
Indian:													
Champion Reef	513,832		10	0	6	6	Jan., 1904	1	15	0	1	16	3
Mysore	566,043		10	0	5	6	Mar., 1904	6	12	6	6	15	0
Nundydroog	484,000		10	0	1	8	Mar., 1904	2	1	3	2	3	9
Ooregum	343,000		10	0		9	Dec., 1903	1	0	0	1	2	6
Ooregum, pfd	240,000		10	0	1	9	Dec., 1903	1	7	6	1	10	0
South African:													
*Angelo	600,000	1	0	0	4	0	Feb., 1904	6	6	0	6	5	0
*Bonanza	200,000	1	0	0	10	0	Feb., 1904	1	17	6	2	0	0
British South Africa	4,436,019	1	0	0	rts.		May, 1889	1	11	10	2	1	1
Cape Copper	300,000	2	0	0	4	0	Jan., 1904	2	7	6	2	12	6
Cape Copper, pfd	75,000	2	0	0	1	9	Jan., 1904	2	15	0	3	0	0
*City & Suburban	340,000	4	0	0	8	0	Feb., 1904	6	0	0	6	5	0
Consol. Gold-Fields	2,000,000	1	0	0	..	..	.....	15	7	6	5	8	9
Crown Reef	120,000	1	0	0	20	0	Oct., 1903	15	5	0	15	15	0
De Beers, preferred	800,000	2	10	0	10	0	Jan., 1904	18	13	9	18	16	3
De Beers, deferred	1,000,000	2	10	0	15	0	Jan., 1904	19	3	9	19	6	3
East Rand	990,000	1	0	0	5	0	Aug., 1903	5	18	9	6	0	0
Ferreira	90,000	1	0	0	22	6	Feb., 1904	18	10	0	19	0	0
Geldenhuis	200,000	1	0	0	6	0	Feb., 1904	5	0	0	5	5	0
Geduld	400,000	1	0	0	rts.		Mar., 1902	5	1	3	5	3	9
Henry Nourse	125,000	1	0	0	10	0	Feb., 1904	7	17	6	8	2	6
*Jubilee	50,000	1	0	0	5	0	Feb., 1904	3	10	0	3	15	0
Jumpers	100,000	1	0	0	5	0	Aug., 1899	2	7	6	2	12	6
†Langlaagte	470,000	1	0	0	2	0	Feb., 1904	3	3	9	3	6	3
May	288,750	1	0	0	3	6	Feb., 1904	3	15	0	3	17	6
Meyer & Charlton	100,000	1	0	0	5	0	Jan., 1904	4	10	0	4	15	0
Modderfontein	290,000	1	0	0	rts.		Apr., 1902	7	0	0	7	2	6
Namaqua	94,331	2	0	0	3	0	Dec., 1903	2	17	6	3	2	6
New Jagersfontein	200,000	5	0	0	10	0	Dec., 1903	27	10	0	28	0	0
New Primrose	325,000	1	0	0	3	0	Mar., 1904	3	10	0	3	12	6
Rand	1,795,956		5	0	4	0	Aug., 1902	8	12	6	8	13	0
Robinson	750,000	5	0	0	5	6	Feb., 1904	9	2	6	9	7	6
Robinson Deep	950,000	1	0	0	3	0	Jan., 1904	4	15	0	4	17	6
Rose Deep	425,000	1	0	0	2	6	Feb., 1904	7	0	0	7	5	0
Salisbury	100,000	1	0	0	2	0	Mar , 1899	1	10	0	1	15	0
Sheba	1,075,000	1	0	0		6	July, 1899		5	6		6	6
Village	400,000	1	0	0	3	0	Feb., 1904	6	2	6	6	7	6
Wemmer	80,000	1	0	0	10	0	Jan., 1904	9	10	0	10	0	0

*Ex-dividend.

LONDON (By Cable.)*

Company.	Mar. 9 £.	s.	d.	Mar. 16 £.	s.	d.	Company.	Mar. 9 £.	s.	d.	Mar. 16 £.	s.	d.
Anaconda	3	5	0	3	7	6	El Oro	1	2	6	1	2	6
British So. Africa	1	11	3	1	13	9	Modderfontein	6	16	3	6	16	7½
Camp Bird	1	3	6	1	4	4½	Rand Mines	8	12	6	9	7	6
Con. Gold Fields	5	8	9	5	17	6	Rio Tinto	47	7	6	49	5	0
De Beers	19	2	6	19	15	0	Simmer & Jack	1	8	1½	1	8	1½
East Rand	5	16	3	6	7	6	Tomboy	1	6	3	1	8	1½

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 25

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France	.....	290.00	5,500.00	5,500.00	5,500.00
Boleo, c	Lower Cal	12,000,000	500	62.50	1,740.00	1,695.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	18.00	16.00
Courrieres, Coal	France	600,000	500	110.00	2,660.00	2,650.00
Fraser River, g	Brit. Col	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	73.00	66.00
Laurium, z. l	Greece	16,300,000	500	25.00	325.00	315.00
Malfidano, z	Italy	12,500,000	500	50.00	582.00	570.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	484.00	456.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	825.00	825.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	490.00	500.00
Penarroya, Coal	Spain	.....	500	45.00	1,070.00	1,042.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	685.00	670.00
Wyoming, o	Wyoming	.....	25	.....	356.00	357.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* March 12

Name.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$10	$0.15	$0.30	Columbia Lead, Mo.	$10	$3.00	$4.00
Catherine Lead, Mo.	10	1.50	2.00	Con. Coal, Ill	100	16.00	18.00
Central Coal & C	100	58.25	59.75	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf.	100	70.00	71.00	Granite Bimet. Mt.	10	.40	.47
Central Lead, Mo	100	110.00	115.00	St. Joe Lead, Mo,	10	14.50	16.50

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.48@2.50
Refined wood, 95@97%	"	.50@.55
Purified	"	1.25@1.30
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate gram	"	.05⅝
Lump	"	.09½
Nitrate, white pure (98⅝)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03@.03½
Red	"	.03⅝@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Ventura, Cal.	sh. ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21 00
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾

BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.65 @1.70
Chem. pure cryst.	lb.	.05
Nitrate, powdered	"	.05¾
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-flake	"	18.00
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02¼
BORAX	"	.07¼@.07½
BROMIDE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.45
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.45@1.60
Foreign	"	1.75@2.25
"Rosendale," 300 lbs.	"	.80
Slag cement	"	1.25@1.50
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk.	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% cb.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINE—Am. com., exdock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.12½@.12⅝
FELDSPAR—Ground	sh. ton	@10.00
FLINT PEBBLES—Danish. Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50

FULLER'S EARTH—Lump	100 lbs.	$.80
Powdered	"	.85
GRAPHITE—Am. f.o.b. Providence, R.I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03¼
Best pulverized	"	.04@.08
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Ground.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08¼ @ .83¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
" gran	"	.06¾
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160.00@200.00
MAGNESIUM—		
Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01¼@ 01½
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets are sold as to size and quality		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr. 25@30, cold test	gal.	.13@.13¾
15, cold test	"	.13¾@.14¼
Zero	"	.18¼@.19¼
Summer	"	.12¾@.13¼
Cylinder, dark steam ref	"	.14¼@.16¼
Dark, filtered	"	.18¼@.19½
Light, filtered	"	.20¼@.21¼
Extra cold test	"	.24¾@.31¾
Gasoline, 86 @90°	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.38@.42
Boiled	"	.44
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	10¾
Best	"	.14
Lampblack, com'l	"	.04¾
Refined	"	.07
Litharge, Am. pow'd.	"	.05¼@.05¾
English Glassmakers'	"	.08½@.08⅞
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.03
French, washed	"	.01¼@.01⅞
Orange mineral, Am.	"	.07⅝@.07¾
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.11

PAINTS AND COLORS—		
Red lead, American	lb	$0.06¼@$0.06½
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	@.64
White lead, Am., dry	lb.	.04¾@.05
American, in oil	"	.05¼@.06½
Foreign, in oil	"	.09 @.09½
Zinc, white, Am., ex. dry	"	.04½@.04¾
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.06½@.09½
POTASH—		
Caustic, ordinary	"	.04½@.04⅞
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst.	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08¼@.08½
Scotch	"	.08⅝@.08¾
Bromide	"	@.30
Carbonate (80@85%)	"	.03½@.04½
Chlorate, powdered	"	.06¾@.07¼
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19 @.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09⅝
Prussiate, yellow	"	.14⅝@.15
Red	"	.36 @.36¾
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lbs.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs.	3.45@3.60
Refined	"	4.00@4 50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.36¾
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk f.o.b. works	100 lbs.	1.30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06⅜
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.80
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 70@76%, f. o. b. works	"	1.75@1.90
Foreign, f.o.b N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06¾@.07
Hyposulphite, Am.	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	@ 2.1½
Shipments	"	2.05@2.12½
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.10½
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01¾
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade.	sh. ton	20.00
N. Y., Fibrous, best	"	10.28
French, best	100 lbs.	2.00
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil, bbl	"	4.10
TIN—Crystals, bbl.	lb.	.21½
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.07⅞
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04⅝@.04⅝
Dust	"	.04⅞@.05
Sulphate	"	.02 @.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07¼@.08¼
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

Note.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the Engineering and Mining Journal are requested to report any corrections needed, or to suggest additions which they may consider advisable.